

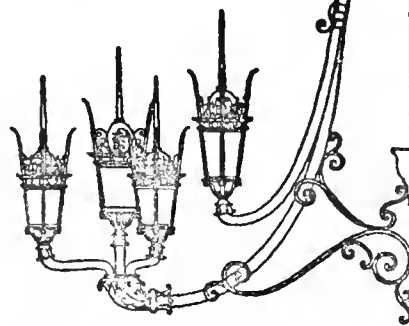
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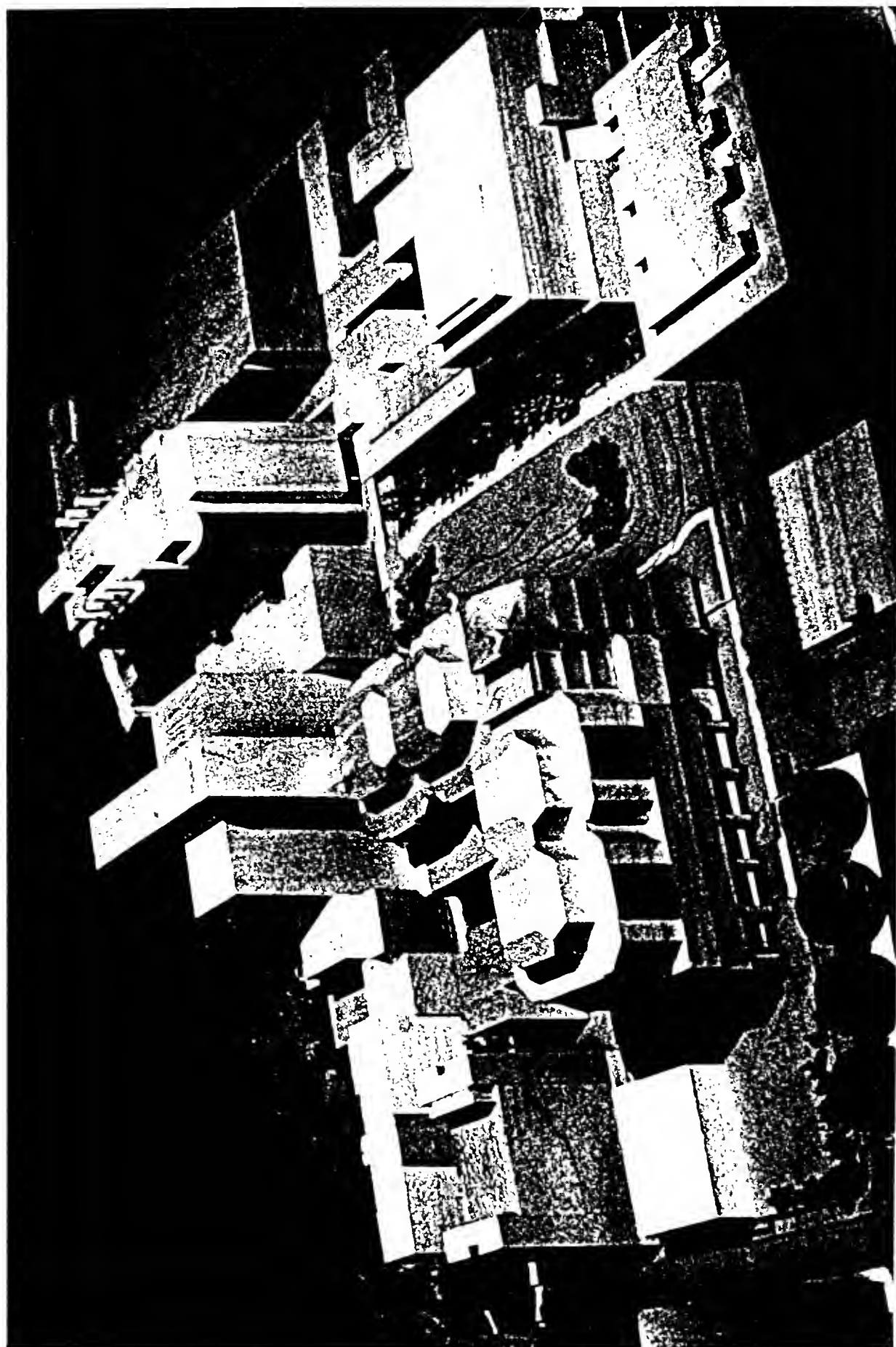


New England Deaconess Hospital

INSTITUTIONAL MASTER PLAN

1993-2003

October, 1993
(rev.)



NEW ENGLAND DEACONESS HOSPITAL

INSTITUTIONAL MASTER PLAN

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Impact Study, New England Deaconess Hospital,
Prepared by HMM Associates, Inc., dated
March, 1993

NEW ENGLAND DEACONESS HOSPITAL

INSTITUTIONAL MASTER PLAN*

EXECUTIVE SUMMARY

New England Deaconess Hospital is a sophisticated tertiary care institution known for academic excellence and research of the highest standards. The Hospital recognizes the need to plan well into the future in order to effectively anticipate and respond to the needs of its patients, doctors, and the medical community as a whole. This Institutional Master Plan is a planning tool that will assist the Hospital in directing the utilization and deployment of its resources into the next decade.

The Hospital's campus is located on the westerly side of Brookline Avenue on approximately 378,000 square feet of land (excluding areas within streets) within the Longwood Medical Area of Boston. The surrounding Longwood Medical Area is characterized by medical institutions and health care-related uses. The Riverway parkway and park area bounds the Deaconess campus to the immediate west and south.

Space within the Deaconess campus and the Longwood Medical Area is at a premium. It is therefore imperative that Deaconess

* This Institutional Master Plan was originally prepared and presented by the Hospital in 1990. Since that time, the Hospital has proceeded with several of the projects described below, and has prepared and presented updated versions of the master plan dated January, 1991, and October, 1993.

make sound planning decisions in the utilization of its facilities. Existing overcrowded conditions have forced the Hospital to resort to makeshift and often inefficient dispersions of programs and departments. Because of space limitations and other deficiencies in the Hospital's physical plant, the Hospital has found it difficult to efficiently operate existing programs and to introduce new technologies. Yet, the demand for the Hospital's services, and an ever wider range of programs, research capabilities and technology is increasing at an astounding rate.

It is not physically or financially feasible for the Hospital to address all of its physical needs simultaneously. The Hospital has established priorities for facilities reorganization and modernization on the basis of the Hospital's planning goals, the immediacy and urgency of the existing identified deficiencies and the anticipated trends in the delivery and financing of health care services.

The Hospital has targeted those portions of its physical plant which are obsolete and incapable of supporting its programs for renovation and redevelopment. It has adopted a Master Plan which combines a reorganization of existing functional space with the upgrading of outdated space. In general, high density diagnostic and patient care uses will remain in the center of campus. Medical research functions will be concentrated in close proximity to the primary patient care facilities. Upgraded commercial/retail uses will be clustered along Brookline Avenue, while existing parking facilities at the edge of the campus will be retained.

A. Master Plan Projects.

The Hospital has identified at least three major development projects to upgrade its facilities. The three primary projects are the renovation of the Kennedy Building (recently completed) located at 1 Autumn Street into an ambulatory care center, the construction of a new clinical facility adjacent to the intersection of Pilgrim Road and Deaconess Road extending to Brookline Avenue, and the construction of a new research facility in the current location of the Maintenance Building on Pilgrim Road. These projects do not represent a major expansion of the Hospital, but are instead designed to address existing deficiencies and accommodate anticipated needs.

1. Kennedy Ambulatory Care Facility.

The elimination of the school of nursing formerly housed in the Kennedy Building and the renovation of the interior of that Building into an ambulatory care center was recently completed. This eight (8) story, 90,000 gross square foot ambulatory care center addressed one of the Hospital's most pressing needs while generating no significant operating impacts on surrounding areas. All of the renovations were interior and therefore the size and exterior appearance of the Building was unchanged. No significant increase in staff levels has occurred at the Kennedy Building as a result of the change in use, and, due to the change in the use of the building from a school of nursing to an ambulatory care facility, vehicle trips generated by the building, while formerly clustered around the peak commuting hours, are now concentrated between the hours of 10:00 a.m. and

3:00 p.m. It was estimated that the facility would generate twenty vehicle trips per hour between these hours, and sufficient parking has been set aside in the nearby Pilgrim Road Garage.

2. *New Clinical Facility.*

Deaconess began construction in May, 1992 on an approximately 250,000 gross square foot (for floor area ratio purposes) patient care facility to be located at One Deaconess Road. The construction of this facility was preceded by the demolition of Harris Hall, an obsolete structure containing support functions. The new clinical facility will be located across Pilgrim Road from the Hospital's existing primary patient care building and will be connected to that building by glass-enclosed, elevated passageways above Pilgrim Road at levels 3 through 5. This will enable the two buildings to function as a coherent patient care facility.

Generally, diagnostic and treatment functions will be upgraded and relocated into the new clinical facility. The new facility will alleviate existing overcrowded conditions in the Hospital's primary patient care facilities and will provide the necessary space for efficient realignment and operation of the Hospital's existing programs and departments. It is not intended as an expansion of the Hospital's programs and therefore is not expected to generate a significant net increase in Hospital personnel or create the need for a significant amount of increased parking or other support functions.

3. Renovation of Existing Clinical Space.

In conjunction with the construction of the new clinical facility, the Hospital will also modernize its existing clinical space. This space, which is located in the Palmer, Baker, Farr and Deaconess Buildings directly across Pilgrim Road from the proposed location of the new clinical facility, needs substantial renovation and upgrading. The Hospital has undertaken a program to correct the deficiencies in this space and to coherently relate this space to the new clinical facility. This work is discussed further under "Renovation of Existing Clinical Space" below.

4. New Research Facility.

The Hospital has identified an urgent need for modern research space in proximity to its clinical programs. The Hospital intends to address a major portion of this need through the construction of a new research facility at the current location of the Maintenance Building and temporary office structures in the area bounded by Pilgrim Road, the Deaconess Building, Autumn Street, and the Pilgrim Road Garage. The Maintenance Building, which is in poor condition and badly outdated, and the temporary structures near Autumn Street, will be demolished to make way for the new facility. The aggregate space of the structures to be demolished is approximately 38,000 square feet.

The new research facility will be ideally located near the Hospital's clinical programs in order to accommodate the Hospital's focus on patient care research. The new facility will

enable the Hospital to consolidate many of its research programs which are currently dispersed in space on and off-campus, relieve overcrowded conditions within existing research space and provide badly needed room for expansion of research programs. The new research facility will also enable the Hospital to demolish the outdated CRI Building along Pilgrim Road.

The new research building is expected to have a total floor area of approximately 236,740 gross square feet (for floor area ratio purposes), to consist of eleven stories and to be approximately 175 feet in height. The project site is approximately 36,205 square feet in size. Because the building footprint is expected to encompass substantially all of the project site, the building will have a floor area ratio of approximately 6.6.

5. Other Projects.

In addition to these major projects, the Hospital is also undertaking other measures to upgrade its facilities and support its programs and personnel. A day care center accommodating up to fifty-eight children is located within the Maintenance Building. This day care space will be relocated to 306 The Riverway when the Maintenance Building is demolished to make way for the new research facility. The Hospital recently added three floors containing approximately 4,100 square feet each between its existing Baker and Palmer Buildings (the "Baker-Palmer Span"). This space along with additional space leased off-campus will help to alleviate the Hospital's need for support space which was created by the demolition of Harris Hall.

B. Parking.

The majority of existing on-campus parking will be retained primarily at the outer edges of the campus. Any new on-campus parking demands for patients will be accommodated through a combination of displacing staff and employee spaces to off-campus locations and through aggressive mitigation measures. These measures are discussed in more detail in the Institutional Master Plan Transportation Impact Study attached as Appendix A and include educational programs, mass transit subsidiaries, ridesharing promotions, shuttle bus service to off-campus parking areas and other programs designed to encourage employees to use alternative means of transportation.

C. Open Space.

The primary areas of public open space on the Deaconess campus are Joslin Park, located between Joslin Place and Deaconess Road, and the Riverway at the western boundary of the Campus. The Hospital's new clinical facility will relocate the main entrance of the Hospital to Deaconess Road adjacent to Joslin Park, which will improve the surrounding context of the park. In addition, as part of the clinical facility project the portion of Pilgrim Road between Deaconess Road and Francis Street will become a reduced access private way with widened sidewalks and an enhanced pedestrian environment. A proposed open space improvement plan has been prepared in connection with the Hospital's proposed new research facility. The Hospital will

continue to explore ways to enhance the existing open space and pedestrian environment in and around the Deaconess campus.

D. Environmental Impacts.

This Institutional Master Plan discusses both the short term construction impacts and long term operational impacts that the Hospital's proposed projects will have on the surrounding community. The Hospital has carefully considered development alternatives and has attempted to mitigate potential detrimental impacts wherever possible. In a bold mitigation strategy to help alleviate traffic congestion on Brookline Avenue, the Hospital donated land sufficient to add an additional travel lane between Deaconess Road and Francis Street in conjunction with construction of the new clinical facility. The Hospital anticipates continuing to work with State, City and community leaders to identify and minimize environmental impacts through the MEPA process and the City's zoning and environmental review process.

E. Public Benefits.

New England Deaconess Hospital plays an integral part in the economy and well-being of the City of Boston and is also an important neighbor to its surrounding community. The Hospital's development and renovation plans will have substantial beneficial impacts on the community and the City. The appearance of the Longwood Medical area will be enhanced, pedestrian and vehicular transportation in the area should be improved, and the Hospital's

redevelopment programs will generate significant linkage and other indirect revenue to the City. The community benefits program being undertaken by the Hospital is discussed further in Section XII.

The Hospital believes that it can successfully implement a program of renovation and modernization that will allow it to continue as one of Boston's pre-eminent medical institutions well into the twenty-first century, while still maintaining sensitivity to the concerns of the City and local community. This Master Plan is one tool to help strike that balance.

NEW ENGLAND DEACONESS HOSPITAL

Institutional Master Plan

I. INTRODUCTION.

New England Deaconess Hospital is a major tertiary care teaching hospital in the City of Boston, drawing the majority of its patients from New England and eastern New York state. A primary affiliate of Harvard Medical School, Deaconess is a sophisticated tertiary care institution known for academic excellence and research of the highest quality.

Modern health care institutions like Deaconess must be capable of responding quickly to the changing needs of their patients, doctors and staff and to the medical community at large. Careful planning is essential to the ability of these institutions to anticipate and respond effectively to those needs.

This Institutional Master Plan establishes the general framework for the utilization and development of New England Deaconess Hospital's physical resources over the next decade. It targets areas of development as well as areas for reorganization and modernization. It is a flexible planning document that must be periodically re-evaluated and revised in order to respond to unanticipated factors and developments in the health care field.

II. EXISTING CAMPUS, FACILITIES AND PROGRAMS.

A. The Main Campus.

1. Boundaries and Zoning. New England Deaconess Hospital's main campus is located in the Longwood Medical Area of Boston on the westerly side of Brookline Avenue. The main campus is a triangular area, containing approximately 378,000 square feet of land (excluding areas within streets), bounded generally by Brookline Avenue, Longwood Avenue, Joslin Park and the Riverway. See the Campus Plan on the next page and attached as Exhibit A.

Much of the Deaconess campus is within an H (residential/apartment) zoning district, while a small area along Brookline Avenue is within an L (local business and service) zoning district. The entire campus is within an Institutional Overlay District which requires that all new hospital-related uses obtain conditional use permits from the City of Boston Board of Appeal. The campus is also within a Restricted Parking Overlay District which prohibits off-street parking for nonresidential uses without a conditional use permit.

Following the Boston Redevelopment Authority's approval of zoning map and text amendments proposed for the Deaconess campus, and the adoption of these amendments by the Zoning Commission, the Deaconess campus will be rezoned as the New England Deaconess Hospital Institutional District.

2. Surrounding Uses. The Longwood Medical Area which surrounds the Deaconess campus to the north and east is

characterized by medical institutions and health care related uses. The Joslin Diabetes Center is located across Joslin Place from the Deaconess campus. Other major medical institutions in the immediate vicinity include Brigham and Women's Hospital, Beth Israel Hospital, the Dana-Farber Cancer Institute and Children's Hospital.

The portion of Brookline Avenue immediately adjacent to the Deaconess campus was formerly occupied by local commercial and retail uses. This commercial block was deteriorated and visually unattractive and has been demolished to make way for the new clinical facility which will also include commercial and retail uses along Brookline Avenue. A gasoline service station which was located at the corner of Brookline Avenue and Francis Street has also been demolished. The Riverway parkway and park area is located to the immediate west and south of the campus.

B. Existing Facilities, Programs and Uses.

1. ***Buildings.*** The Campus Plan attached as Exhibit A identifies New England Deaconess Hospital's campus buildings. Chart 1 below provides a summary of the age, size and date of construction of each of the buildings shown on the Campus Plan which are owned by the Hospital.

1"=160'

0 80 160 320

SCALE IN FEET



306 RIVERWAY

KENNEDY

TEMPLE ISRAEL

PLYMOUTH ROAD

375
LONGWOOD
AVENUE

LONGWOOD AVENUE

PILGRIM ROAD
GARAGE

CROSSOVER STREET

PROPOSED
RESEARCH FACILITY

DEACONESS

FARR

BAKER

SPAN

PALMER

PILGRIM ROAD

APARTMENTS

JOSLIN ROAD

JOSLIN PARK

DEACONESS ROAD

NEW CLINICAL
BUILDING

C.R.I.

MEISSNER

OVERHOLT

FRANCIS STREET

LOWRY

110 FRANCIS
STREET GARAGE

WINSOR SCHOOL

BETH ISRAEL HOSPITAL

BROOKLINE AVENUE

MAYER

MEDICAL
BUILDING

M.A.T.E.P.

SERVICENTER

Campus Master Site Plan New England Deaconess Hospital



HMM Associates, Inc.
A Summit Company

Chart 1

New England Deaconess Hospital/Existing Facilities¹

Building	Estimated Gross Floor Area²	Stories³	Estimated Height	Date of Original Construction
Palmer	64,869 gsf	7	72 ft.	1927 1937 1965
Baker (including Baker-Palmer Span)	64,568 gsf	7	86 ft.	1934
Farr (including Chapel)	382,020 gsf	15	170 ft.	1953 1971
Deaconess	87,726 gsf	6	60 ft.	1907 1923
Maintenance	33,135 gsf	3	24 ft.	1959
306 The Riverway	29,904 gsf	6	72 ft.	1928
Kennedy	89,584 gsf	8	84 ft.	1977
Pilgrim Road Garage	245,315 gsf (761 parking spaces)	7	67 ft.	1972
Cancer Research Institute	48,955 gsf	5	60 ft.	1951
Meissner	82,728 gsf	8	72 ft.	1976
110 Francis Street Garage	136,092 gsf (310 parking spaces)	6	60 ft.	1963
Lowry	103,125 gsf	11	120 ft.	1965
MRI	1,457 gsf	1	12 ft.	1986

¹ See Campus Plan for location of each facility.

² Estimated gross floor area calculated using building footprint.

³ Includes basement levels.

In addition to the buildings listed above, the new clinical facility will have a gross floor area of approximately 250,000 gross square feet (for floor area ratio purposes), will have two basement levels plus seven floors and be approximately 108 feet in height, and is expected to be completed by December 1994. A total of 1,619,428 estimated gross square feet of building will exist on-campus, including the new clinical facility. Based on these estimated gross floor areas, the Deaconess campus will have an average floor area ratio of approximately 4.3. When the proposed new research facility is built, the Deaconess campus will have an average floor area ratio of approximately 4.5.

2. Age of Physical Plant. Although many of the Hospital's buildings still have long useful lives ahead of them, some of the buildings will require major investments to extend their serviceability. A study conducted for the Hospital in March 1985 by Marvin Bostin Associates and Payette Associates reviewed the condition of each of the Hospital's buildings located on its main campus. The buildings were categorized as follows:

Up to Date Buildings (only routine maintenance required):

- Lowry Medical Office Building
- Meissner Laboratory
- Farr Building (upper floors)
- Kennedy Hall
- Baker-Palmer Span
- Francis Street Parking Garage

Buildings with Limited Deficiencies (require moderate updating of building systems):

- Cancer Research Institute
- Farr Building (lower floors)
- Palmer Memorial Building
- Baker Building
- Pilgrim Road Garage

Buildings with Significant Deficiencies (obsolete - require major renovation):

- Deaconess Building
- Harris Hall (Recently Demolished)
- Maintenance (To be Demolished)
- 306 The Riverway

3. *Programs and Uses.* The Hospital's primary clinical and patient care facility is the Farr Building (and after completion, the new clinical facility). Support programs and additional in-patient programs are provided in the Palmer Building, the Baker Building and the Deaconess Building. The primary surgical areas are located in the Farr Building (and after completion, the New Clinical Facility). Out-patient and ambulatory care services are primarily provided in the Lowry Medical Office Building and the Kennedy Ambulatory Care Building. The current primary uses of on-campus buildings are indicated in Chart 2 below.

Chart 2

Current Primary Uses¹

Palmer	Hospital: in-patient (medical and psychiatric), support
Baker (including Baker-Palmer Span)	Hospital: in-patient, support
Farr	Hospital: in-patient, support
Deaconess	Hospital: in-patient (medical and psychiatric), support
Maintenance (site of Proposed Research Facility)	Day care, Hospital support
306 The Riverway	Apartments
Kennedy	Ambulatory care, Hospital support, conference center
Pilgrim Road Garage	Parking (761 spaces)
Cancer Research Institute (CRI)	Research, animal facility
Meissner	Hospital laboratories and research
110 Francis Street Garage	Parking (310 spaces)
Lowry	Ambulatory care
MRI	Hospital
New Clinical Building	Hospital: in-patient, support, retail

¹ Palmer, Baker, Farr, Deaconess and the new clinical facilities, which primarily contain the Hospital's in-patient services, also contain numerous secondary ambulatory care services, including various diagnostic testing and rehabilitation services.

The Hospital also leases off-campus space for a variety of Hospital uses at the following locations:

375 Longwood Avenue (MASCO building)	Administrative offices, Hospital support
50 Binney Street (Shields Warren Building)	Research
Longwood Galleria	Administrative offices, Hospital support
21-27 Burlington Avenue	Research
900 Commonwealth Avenue	Business office, purchasing, Hospital support
333 Longwood Avenue	Ambulatory care
One Brookline Place, Brookline	Ambulatory care
Two Oliver Street	Ambulatory care
Joslin Clinic	In-patient

In addition, the Deaconess has entered into a lease for approximately 25,000 square feet of research space at 99 Brookline Avenue which is currently being constructed by the Beth Israel Hospital.

4. Research. New England Deaconess Hospital currently devotes approximately 70,890 net square feet of space to laboratory research and associated support functions. This space is dispersed among the Cancer Research Institute ("CRI"), 21-27 Burlington Avenue, 180 Longwood Avenue and the Palmer Building. Deaconess devoted over \$17,000,000 on research activities in 1992, employing a total of fifty-six (56) research laboratory chiefs. These laboratory chiefs, all of whom also see patients, supervised 185 post-doctoral fellows, research associates, research technicians and junior faculty. The Hospital's sources of research funding in 1992 included approximately \$13,000,000 of federal government funds, approximately \$4,000,000 of private industry funds and approximately \$1,000,000 of Foundation funds.

Research is performed in a variety of departments including medicine, surgery, radiology, pathology and others.

The Hospital's existing research programs include:

- Laboratory Research on AIDS and AIDS related problems. Includes research programs to better define the life cycle of the virus that causes this disease.
- Laboratory research on nutrition. Includes the study of medical problems in ingesting, absorbing and adequately utilizing nutrients. In addition, research is being undertaken to better define which nutrients best provide specific physiological benefits.
- Laboratory Research in cardiovascular disease. Includes the study of how best to analyze clots which are formed (i.e., improve thrombolytic therapy)
- Laboratory Research in transplantation. Transplantation at Deaconess involves several organs including the liver, kidney, and small bowel. Research in this area is aimed at overcoming two major issues: First, how to improve the survival/function of transplanted organs so that the window of opportunity for transplantation from a cadaver is as long as possible. Second, how to reduce or prevent the immune mediated rejection of transplanted organs when a complete tissue-match between donor and recipient is not possible.
- Laboratory research in nephrology. Research to study oxygen deprivation in the tubules of the kidney due to acute renal failure as well as research to compare how different groups of animals such as mammals and fish maintain their salt balance.
- Research in hematology/oncology. Research aimed at identifying which genes are read that should not be read and then interfering with the function of those genes. Also, concentration in research on solid tumors where such events can be more difficult to study than the more commonly studied leukemia and lymphomas with special orientation to tumors that are treatable by combination therapies involving surgery such as cancer to the colon or bladder.
- Research in infectious diseases. Studies to overcome antibiotic resistance where there are unique infectious complications associated with other major diseases such as diabetes.
- Research in neurology/neurochemistry. Research using clinical material from man and animals to establish

invitro tissue and organ cultures which can be used to better understand how the nervous system works and how different drugs exert their effects.

- Research in rheumatology. Research dealing with diseases of joints and associated tissues.

Deaconess is committed to maintaining the highest standards of research capabilities commensurate with its position as one of Boston's pre-eminent teaching hospitals.

5. Massing. The existing Farr Building at the center of the main campus is the tallest of the Hospital's buildings (eleven stories) and contains the most significant concentrations of patient beds and diagnostic departments. High volume ambulatory care functions (medical office/exam type functions) and their related parking structures are at the perimeters of the campus, thereby limiting through-traffic within the campus. Buildings along the Riverway are set back from lot lines and are at a lower scale than buildings in the center of campus.

6. Traffic Circulation. Traffic patterns on the Deaconess campus are illustrated on Exhibit B. Brookline Avenue, Longwood Avenue and the Riverway are the primary vehicular access routes to the campus. Francis Street (two-way), Pilgrim Road (one-way heading south), Joslin Place (one-way entering the campus from Brookline Avenue), Deaconess Road (one-way exiting the campus back onto Brookline Avenue), and Autumn Street (one-way entering the campus from the Riverway) are secondary traffic routes.

As a result of the limited size of the Deaconess campus and the location of major through-streets on the perimeters of campus, the primary function of these secondary traffic routes is to handle local Hospital traffic. The closure of Pilgrim Road

between Brookline Avenue and Longwood Avenue several years ago eliminated a shortcut route for through traffic and further reinforced the status of these secondary routes as a system of internal streets primarily serving Deaconess.

7. **Loading Areas.** The central supply center for the Hospital was formerly located adjacent to Brookline Avenue between Deaconess Road and Francis Street in a building since demolished to enable the construction of the new clinical facility. This location required delivery trucks to back along Brookline Avenue into the supply center loading area, often resulting in traffic delays. To remedy this situation, the Hospital relocated its main supply center off-campus to Roxbury. The Hospital currently uses a system of decentralized satellite supply areas scattered throughout the campus, stocking these areas as needed with deliveries from the main supply center. These deliveries can be made by smaller vehicles and can be timed to coincide with off-peak traffic hours on Brookline Avenue.

8. **Parking.** Parking garages located on the perimeter of the Deaconess campus at the 110 Francis Street Parking Garage and the Pilgrim Road Garage accommodate over 1,000 cars and account for almost all of the on-campus parking. Parking is not allocated on a building by building basis. A small amount of additional parking is available along inner streets.

In addition to the on-campus parking, the Hospital leases an off-campus parking facility and subsidizes four off-campus parking facilities operated by the Medical Area Service Company (MASCO), a cooperative agency owned by institutions in the

Longwood Medical Area. The Hospital encourages its employees to park in the MASCO lots and to utilize MASCO shuttle buses or other forms of public transportation to and from the Hospital. Deaconess also promotes a variety of other programs designed to encourage employees to utilize alternative forms of transportation, including substantial discounts for MBTA passes, van-pooling programs such as Caravan for Commuters, and computerized carpool matching offered by MASCO.

9. Traffic Volumes. An analysis of the existing and projected volumes of traffic along routes and at intersections in and around the Deaconess campus is set forth in a Transportation Impact Study dated March, 1993, prepared by HMM Associates, included in this Master Plan as Appendix A. The traffic volumes utilized in the Study reflect increased traffic volumes on-campus due to increases in emergency room and ambulatory care visits to the Hospital in recent years.

10. Pedestrian Circulation. On-campus internal streets provide convenient and effective routes for pedestrian circulation throughout the Deaconess campus. The entrance to the Farr Building on Pilgrim Road is the main entrance for in-patients and visitors to the Hospital and is considered the Hospital's front door. This entrance is not visible from Brookline Avenue and fails to provide a clear point of identity for the Hospital. Other major points of entry include the ambulatory care facility at the Lowry Building, the new ambulatory care facility in the Kennedy Building and the Meissner Building. The proposed

pedestrian entry points are shown on the Proposed Site Circulation plan attached as Exhibit B.

11. Open Space. Public open space on the Deaconess campus is provided and maintained by the Hospital at Joslin Park which is located between Joslin Place and Deaconess Road. Joslin Park is landscaped with trees and park benches and provides a refreshing park area and inviting entrance to the Deaconess campus. Signage identifies the park as a public open space. The Riverway parkway and park area also bound the Deaconess campus to the west.

12. Building Utilities. The heaviest concentration of utility systems (sewer, steam and chilled water) serving the campus is under Joslin Park and Pilgrim Road. The layout of utilities is shown on Exhibits D and E. The utility infrastructure available to the campus appears to be sufficient to accommodate future development at the Hospital.

C. Employment.

Deaconess presently employs an estimated 2,906 persons, comprised of 660 part-time and 2,246 full-time employees. A breakdown of employees by group is provided in Chart 3 below:

Chart 3

Employment

<u>Employee Group</u>	<u>Full-Time</u>	<u>Part-Time</u>	<u>Total</u>
<u>Administrative</u> (Secretaries, Billers, Office/Clerical...)	410	107	517
<u>Technical</u> (Med Techs, Pharmacists, Physical Therapists...)	461	138	599
<u>Nursing</u> (Nursing Assist. thru LPN)	90	24	114
<u>Nursing</u> (Staff RN's)	428	191	619
<u>Nursing Management</u> (Supvs, Nurse Mgrs, Directors)	53	13	66
<u>Support</u> (Maint., Bldg. Svcs., Dietary)	193	92	285
<u>Trades</u> (Eng. & Maint.)	16	0	16
<u>Professional</u> (Sr. Techs. Supvs. Mgrs., Administration)	243	41	284
<u>Physicians</u>	119	30	149
<u>Residents</u>	225	0	225
<u>Students</u> (Nursing, Pharmacy, Med. Tech)	8	24	32
TOTAL	2,246	660	2,906

D. Existing Public Benefits.

Boston's health care institutions play an integral role in the economy and well-being of the City. Boston enjoys a reputation as a center for higher learning in the areas of science and medicine. Professors, physicians and other medical professionals are attracted to the area because of this reputation. The availability of advanced medical care is an

asset that helps to make Boston a desirable city in which to live and work.

The medical community stimulates the local economy in a variety of ways. In addition to providing jobs to thousands of Boston area residents, local hospitals create the need for an entire industry of health care support services and manufacturing products. As these businesses are attracted to the Boston area to be near the ultimate users of their products and services, more job opportunities are created and local tax revenues increase.

Deaconess is an important member of Boston's medical community. Its programs in the areas of cancer, organ transplantation, cardiovascular disease, AIDS and diabetes are among the best in the nation. Especially noteworthy is the leadership role the Hospital has played in providing medical care for women and men with AIDS, many of whom are from the Boston area. The Hospital's reputation can only reflect favorably on the City.

The Hospital contributes revenue directly to the City in the form of linkage payments and payments in lieu of taxes. In connection with the development of its proposed clinical facility (discussed below), Deaconess has agreed to make linkage payments to the City, in excess of \$1,000,000. These funds can be used to subsidize the creation of affordable housing and housing support services or to create job training programs. In addition, the Hospital has begun to implement a \$2,600,000 outreach program in the area of AIDs and geriatric services.

Deaconess is also a good neighbor to its surrounding communities. The Hospital has worked with community health centers to address the needs of area community residents. In addition to financial support, the Hospital offers staffing and technical support.

- Since 1985, residents from Deaconess have seen patients at the Roxbury Comprehensive Community Health Center (RoxComp) every week. The Hospital also provides training in the areas of AIDs and geriatrics to RoxComp's care providers.
- The Hospital's relationship with the Fenway Community Health Center extends back to 1972, and over the years has included physician time spent at weekly clinics, financial support and assistance in the establishment of a laboratory for the Center.
- The Hospital has also been involved with the Dimock Community Health Center through fundraising efforts and participation in histology technician training programs.
- In addition, the Hospital works with a variety of other community agencies including the AIDs Action Committee, the Whittier Street Neighborhood Health Center and Womens Inc.

In addition, the Deaconess Hospital has been very involved in programs that provide job and educational opportunities to Boston's youth. Hospital President and CEO, J. Richard Gaintner, M.D., was chair of the Private Industry Council's 1992 Summer Jobs Program which is working to provide employment opportunities for over 2,500 high school students and recent graduates.

The Summer Jobs Program complements the Hospital's affiliation with Project ProTech, an innovative school-to-work program established to reform vocational education. Aspiring health care workers from Boston English High School have had their first introduction to the Deaconess work environment through these efforts.

The Deaconess Hospital has also been a strong supporter of a variety of community programs from Mission Possible, a summer day camp for Mission Hill children, to the Fenway Food Project to the Boston Adult Literacy Fund. The Hospital has been very active in United Way efforts and in 1990, Dr. Gaintner served as chairman of the medical community's successful fund raising campaign.

Deaconess contributes to the Boston community in a variety of ways. It helps to enhance the City's image and reputation; it attracts first rate medical professions in the area; it stimulates the economy; and it contributes at the local level to help address the medical needs of its surrounding community.

The community benefit program being undertaken by the Hospital is discussed further in Section XII.

III. THE PLANNING PROCESS.

The facilities planning process undertaken by New England Deaconess Hospital involves a series of steps designed to create a framework for the allocation of resources for redevelopment at the Hospital. These steps include the following:

- Identify the planning goals and objectives of the Hospital. These objectives will be used to prioritize the needs and development alternatives for the Hospital.
- Identify and assess the external and internal factors which will influence the allocation of available resources. This process involves identifying patient demands and health care trends as well as internal physical, organizational, and programmatic needs and deficiencies.
- Establish a Physical Master Plan as a general framework for future anticipated development.

- Identify specific development projects that will address identified external trends and internal needs and deficiencies.
- Assess the impacts and benefits of future development at the Hospital on the Longwood Medical Area and surrounding neighborhoods.

Deaconess has carefully undertaken this planning process in creating and revising this Master Plan.

IV. PLANNING OBJECTIVES.

The delivery of health care services in today's environment requires an organization capable of meeting the changing needs of patients, professionals, regulating agencies, and the surrounding community. While all of these constituents will influence the Hospital's decisions relating to the allocation of its resources, the ultimate goal of the Hospital is to continue to respond effectively to the needs of its patients while maintaining the institution as one of the foremost specialty referral hospitals in New England. The accomplishment of this goal will require a modern physical plant that is substantial enough to support the Hospital's clinical, research, and educational programs, and attractive enough to provide patient satisfaction, generate pride among Deaconess staff and physicians, and contribute in a positive manner to the synergy of the Longwood Medical Community.

The specific planning goals of the Hospital can be broken down as follows:

- (1) To provide a sufficient quantity and quality of space to accommodate change and to improve efficiency.
- (2) To provide adequate medical research facilities to maintain its position as a top teaching hospital and support its commitment to the Harvard Medical School.

- (3) To create a clear, functional and attractive entry for Hospital patients and visitors and improve the visibility and perception of the Hospital from Brookline Avenue.
- (4) To clarify and simplify traffic circulation within departments, buildings and throughout the campus.
- (5) To improve the physical quality and attractiveness of this part of the Longwood Medical Area and to relocate the Hospital's existing service loading area off of Brookline Avenue.
- (6) To create an overall planning framework to redevelop the Hospital as a more integrated system, with departments properly sized, arranged and located logically with respect to each other.
- (7) To accomplish the foregoing in a manner which will recognize the Hospital's role as a part of the Longwood Medical Community so as to enhance the quality of the residential and institutional life within the community.
- (8) Improve pedestrian circulation and access.
- (9) Whenever possible, increase amount of open space and enhance existing open space.

V. FACTORS INFLUENCING PLANNING DECISIONS.

The factors which will drive the Hospital's planning decisions on the future allocation of resources toward development are a combination of external pressures and limitations and internal physical, organizational and programmatic needs and deficiencies. Although all of these factors are interrelated, they are discussed separately below.

A. External Factors.

1. Growing Demand. In recent years, case mix adjusted discharges have increased from 20,496 in 1987 to 21,813 in 1991, a 6.4% increase for the five-year period. Case mix adjusted discharges are significant because they reflect the increasing intensity and complexity of the cases treated at the Hospital, factors which are recognized in the payments made by third-party payers. Case mix adjusted discharges are developed by applying the Medicare case weight methodology to all discharges. The clinical facilities at the Hospital have already fallen behind demand and will have increased difficulty keeping pace with future growth.

As advances in medical technology permit many clinical services to be conducted on an out-patient basis, the demand for ambulatory/out-patient services will grow at an even faster rate than the demand for in-patient services. Out-patient clinic and emergency room visits have increased 46.4% and 15.3% respectively from 1987 to 1991. For the first three months of 1992 compared to the same period for 1991, clinic visits were up 14% and emergency room visits are up 66.3%. Deaconess must be prepared to modernize its ambulatory/out-patient facilities if it is to meet this rising demand.

Not only are the numbers of in-patients and out-patients growing, but the range of clinical services being demanded is also expanding. The technology for treating patients is progressing at a dramatic rate. Deaconess is under increasing pressure to make new technologies and innovations available to

its patients. Patient rooms, constructed in a different era of health care service, are undersized and ill-suited to accommodate the equipment associated with these new technologies.

Teaching hospitals such as Deaconess are also being asked to expand their commitments to a wider range of medical research and teaching programs. The support facilities for such programs at Deaconess are not adequately equipped to effectively handle these new demands. Moreover, crowded conditions in Hospital rooms hinder primary care training and detract from the residency program. As the teaching of medical professionals takes on greater importance, well designed space for instruction and research will become essential.

2. *Space Limitations.* Available undeveloped space on the Deaconess campus and throughout the Longwood Medical Area is at a premium. It is therefore crucial for Deaconess to make the optimal use of existing land and space.

According to a study by Consultant Marvin Bostin, the average gross square feet per bed for the Deaconess Hospital is substantially below a generally accepted range of 1800 to 2200 gross square feet per bed for a major university-affiliated teaching hospital emphasizing referred tertiary cases like Deaconess. This deficiency is a function of the dramatic growth in high technology and specialty patient care services, the expansion of the scope of educational programs and medical research which has occurred at Deaconess during the past decade, and the failure of the physical facilities at Deaconess to keep pace.

Prior to the construction of the new clinical facility, Deaconess had not added any physical plant for in-patients in over twenty years. The Hospital's facilities have not kept pace with the level of demand or with the level of development of other facilities in the Longwood Medical Area. After the addition of the new clinical facility and the new research facility, the campus-wide floor area ratio will be approximately 4.5.

B. Internal Factors.

1. ***Hospital Space Needs.*** Deaconess' main hospital facility, the Farr Building, is nearly thirty-five years old. While the Farr Building is physically in good condition, it is unrealistic to expect that it will be able to adapt to the dramatic growth and evolution that has occurred in the health care industry.

The Hospital's other primary in-patient care buildings are the Baker, Palmer and Deaconess Buildings, built in 1934, 1927 and 1907, respectively. The overall design of these buildings is antiquated and the configuration of space and utility systems within them is inadequate to accommodate the personnel, equipment and support services needed to deliver the multi-disciplinary level of care required by patients.

The Hospital's support buildings were also examined closely by Consultant Marvin Bostin's Study. The Study identified four support buildings on the Deaconess campus as being in such a deteriorated condition that renovation would not be cost effective.

- (1) Harris Hall (demolished to allow construction of the New Clinical Facility), originally constructed in 1913;
- (2) The Maintenance Building (to be demolished to permit construction of the proposed Research Facility), originally constructed in 1959 and housing the maintenance and laundry facilities; and
- (3) The Deaconess Building constructed in 1907 with additional stories added in 1923, the oldest Deaconess Building currently housing patient beds and other diagnostic and treatment services.

The scarcity of undeveloped space on the Deaconess campus and within the Longwood Medical Area makes it imperative that Deaconess coordinate the phased modernization of space with the demolition and replacement of these deteriorated and obsolete buildings.

2. **Housing.** Housing has also been considered in the Hospital's assessment of its physical plant. The Hospital owns an apartment building at 306 The Riverway which prior to 1993 was in extremely poor physical condition. During 1992 and 1993, the building was substantially rehabilitated, but the Hospital has recently concluded that the need for residential apartments on campus does not support the continued operation of this building solely as an apartment building. All remaining tenants are presently living in the seven apartments on the top floor of the building, and the Hospital now intends to use the lower floors for the relocation of the day care center and Hospital administrative offices presently located on the site of the proposed new research facility.

3. **Parking Facilities.** As in almost every other part of Boston, parking on the Hospital's campus is at a premium.

However, parking studies done on behalf of the Hospital in the past and the Transportation Impact Study attached as Appendix A indicate that the creation of a significant number of new parking spaces on the Deaconess campus would not solve the parking problem and would only exacerbate traffic problems within the Longwood Medical Area.

These studies found that Hospital employees were using a large percentage of the available on-campus parking, thereby decreasing parking availability for patients and visitors and eliminating turnover of spaces during the day. In response to these findings, and as discussed in more detail in the Transportation Impact Study attached as Appendix A, Deaconess has instituted a system to encourage employees to park in off-campus lots and to utilize available shuttle bus service to the Hospital. Car pooling and public transportation use is also encouraged. The Hospital provides subsidized MBTA passes for its employees totaling \$190,000 annually. Through these types of programs, Deaconess has alleviated on-campus parking problems by opening up a greater percentage of on-campus spaces to patients and visitors and by taking advantage of a greater rate of turnover in these spaces.

4. **Organizational and Programmatic Needs.** Organizational and programmatic deficiencies, caused by overcrowded conditions, have hampered the Hospital's ability to efficiently deliver health care services and provide quality teaching programs. The sharp growth in medical technology and the growth in demand for a wide range of clinical and educational services have placed tremendous

pressure on the Hospital's facilities. Doctors, patients and staff have been forced to function in overcrowded space.

In an attempt to ease this pressure, the Hospital has resorted to makeshift and often inefficient dispersions of functions. Programs have been separated into discontinuous units and integrally related functions and departments are often in locations remote from each other. Patients needing ancillary services such as x-rays are often required to be transported between buildings and are subjected to two or more elevator trips. Support facilities, such as out-patient registration and medical records handling, are dispersed throughout campus.

Deaconess has identified several areas where clustering of patients with similar diagnostic problems would be highly beneficial. Clustering allows for a more controlled environment and more efficiency in the delivery of health care services. General space constraints and the lack of available space for labs and other technical support services have severely limited the Hospital's ability to take advantage of such clustering.

Space limitations are adversely affecting the Hospital's ability to introduce technologies/innovations, expand teaching and research commitments, and handle significant increased demand for out-patient services, surgical services, critical care services, cardiology, nutrition support, vascular labs, orthopedics and other programs. Not only are the Hospital's current clinical programs restrained from further expansion, but Deaconess is also unable to implement many new programs which would be in keeping with its long-term goals.

5. **Research Space.** Currently, approximately 225 people work in the Hospital's research space dedicated to medicine, surgery, radiology, pathology and the Joint Center for Radiation Therapy, representing a density of approximately 253 square feet per person. This compares to a target density of 500 net square feet per person established by the Hospital's consultants as the minimum acceptable level. The range for research space used nationally for planning new biomedical research laboratory space extends from 400 to 800 square feet per person. The existing allocation of 253 square feet of space at Deaconess falls well below this level.

Unlike most of the other Longwood Medical Area institutions, which concentrate heavily on biomedical research, Deaconess focusses its research efforts on the application of biomedical knowledge to patient care. The research done at the Hospital seeks to improve the ability of the medical community to diagnose, treat and ultimately prevent disease. Due to the Hospital's concentration on the interface between biomedical science and the care of patients, Deaconess' research programs include a proportionately high representation of researchers who are also active clinicians. Some of these researchers have been hampered in the performance of their dual roles by the lack of proximity between their laboratory and clinical space.

The need for modernized research space at Deaconess in proximity to its clinical facilities is clear. The Hospital has projected a need for approximately 400,000 gross square feet of research space by the year 2000. This need is not driven solely

by a desire to expand research programs, but rather by a need to provide sufficient space for the types of research required to be done at a hospital which specializes in tertiary, referral, acute care as Deaconess does. The availability of adequate research facilities is critical to the Hospital's ability to maintain its position as a pre-eminent teaching institution and to attract leading physicians and federal grants.

The Hospital's ability to successfully bridge basic biomedical study with clinical application will depend upon a modern facility for the care and use of animals. At present, all of the Hospital's animal work is conducted off-campus. The construction of an on-campus facility for animal research is necessary for the Hospital's research commitments.

VI. THE MASTER PLAN.

New England Deaconess is aware that it is not physically or financially feasible to address the physical needs of all departments and programs simultaneously. The Hospital must establish priorities for facilities reorganization and redevelopment on the basis of an evaluation of the Hospital's planning goals, the immediacy of the relationship of the identified deficiencies to patient care activities, anticipated trends in the delivery and financing of health care, and the severity of existing deficiencies.

The Deaconess intends to address its needs in a logical and planned manner. As discussed in this master plan, the Hospital

anticipates future development in the areas of clinical, research, out-patient and patient support services.

A. Uses and Density.

The center of the campus, in the vicinity of the Farr Building extending to Brookline Avenue, will remain the high density diagnostic and patient care use area of the campus. Medical research functions will be concentrated in close proximity to the primary patient care facilities. Future growth in clinical facilities will be concentrated in the space within the block bounded by Pilgrim Road, Deaconess Road, Brookline Avenue and Francis Street. Commercial development will occur along Brookline Avenue. Building heights will be lower at the campus edges, especially along the Riverway. The proposed research facility can be expected to moderately increase the average floor area ratio of the Deaconess campus from approximately 4.3 to 4.5. Renovation of existing space for out-patients is not expected to add to the Hospital campus floor area ratio.

B. Traffic and Parking.

The majority of the existing on-campus parking will be retained. New on-campus parking demands for patients will be accommodated by displacing staff and employee spaces to off-campus locations. Parking and the majority of vehicle traffic will remain at the edges of the site.

No additional on-campus parking will be constructed. The Hospital provides a shuttle service to off-campus parking facilities to encourage employees and staff to park off-campus and to maximize the availability of on-campus parking for patients and visitors. The Hospital has also undertaken other aggressive measures to mitigate traffic and congestion problems in the area. These measures, which are described in the Institutional Master Plan Transportation Impact Study attached as Appendix A, include:

- Subsidies, aggregating \$190,000 annually, of public transit usage among Hospital employees.
- Promotion of ridesharing, including employee matching services, provision of vans, and reservation of on-campus spaces for vans and carpool vehicles.
- The availability of flexible hours on a department by department basis to encourage off-peak time commuting.
- The employment of a parking pricing structure which discourages commuting by car and the provision of bike racks, cages and showers.

C. Entry/Image.

The Master Plan will create a clear and easily identifiable entry off Joslin Park for patients and visitors. Replacement buildings will increase the visibility and accessibility of Deaconess in the Longwood Medical Area. The replacement of the deteriorated commercial block on Brookline Avenue will not only improve the Hospital's image but will also create a visual improvement to all of the Longwood Medical Area.

A proposed open space improvement plan will be implemented between Pilgrim Road and Autumn Street. This project will be

carried out as part of the development of the new research building. Improved visual/pedestrian access is also a long-term goal of the hospital.

D. Pedestrian Circulation.

Due to the enclosed nature of the Deaconess campus, the internal streets on the Deaconess campus provide effective pedestrian routes to all of the Deaconess Buildings. Nonetheless, the pedestrian circulation system will be improved. In connection with the new clinical facility (discussed below) the main entrance to the Hospital will be relocated to the area adjacent to Joslin Park. This will enhance the entrance to the Hospital and will also make the park more accessible to patients, visitors and staff as they enter and exit the Hospital. The park is landscaped with benches and plantings; and, signage will direct pedestrians to the Hospital's new entrance.

Signage throughout the campus will identify Hospital buildings and direct patients and visitors. In connection with the new clinical facility (discussed below), the portion of Pilgrim Road between Deaconess Road and Francis Street will be maintained as a private way available for limited automotive traffic. It is expected that the landscaped sidewalks along this stretch of Pilgrim Road will be widened and enhanced with benches, lighting and plantings. The Roadway will be narrowed and maintained for limited traffic flow. This area and Joslin Park will provide two inviting pedestrian areas adjacent to the Hospital's primary care buildings.

VII. RECENT DEVELOPMENT PROJECTS.

Deaconess has carefully evaluated various development alternatives within the parameters of the Hospital's long-range Master Plan. After careful analysis, the Hospital's development plans revolve around three primary projects: the renovation of the Kennedy Building into an ambulatory care center (which was recently completed), the construction of a new clinical facility (which is nearing completion and which is discussed under "On-Going Projects," below), and the construction of the proposed research facility (which is discussed under "Proposed Projects," below). In addition, the Hospital intends to renovate 306 The Riverway (which is discussed under "On-Going Projects" below).

A. Kennedy Ambulatory Care Facility (completed 1990).

The Hospital recently completed renovations of the Kennedy Building into a new ambulatory (out-patient) care center. As previously discussed, demand for out-patient services is increasing at an astounding rate. As medical technology advances, more services can be provided on an out-patient, as opposed to an in-patient, basis. To accommodate these increased out-patient visits, the Hospital anticipated adding approximately forty new physicians between 1990 and 1992. After careful evaluation of its nursing program, the Hospital elected to discontinue its school of nursing which was formerly located in the Kennedy Building and to renovate the interior of the Kennedy Building to convert it to a new ambulatory care facility.

The Kennedy Building is located within an H-2 Zoning District. It is approximately seventy-seven feet in height and contains approximately 90,000 square feet of gross floor area. The current estimated floor area ratio of the building is approximately 3.7. Because the renovations to the building were confined to the interior, none of these dimensions were altered in a significant way.

The construction cost of the renovation of the Kennedy Building was approximately \$3,900,000. Construction began in June, 1989, and was completed in the late spring of 1990. The renovation of the Kennedy Building project generated approximately seventy-five construction jobs, but is not expected to create a net increase in permanent employment at the Kennedy Building.

The renovation of the Kennedy Building is not expected to result in the addition of new staff. The professional and technical staff of the nursing school has been replaced by a staff with different skills servicing the ambulatory care facility. The School of Nursing formerly operated on a predominantly 9:00 a.m. to 5:00 p.m. basis with the bulk of students arriving during the morning peak hour and departing during the evening peak hour. In contrast, experience shows that the highest volume of traffic is generated at ambulatory care facilities between 10:00 a.m. and 3:00 p.m. It was estimated that the ambulatory care facility would generate twenty patient trips per hour between these hours. Parking spaces in the adjacent Pilgrim Road Garage have been set aside to accommodate these patient trips. This reduces Hospital employee parking in

the garage, which in combination with the elimination of student traffic, should significantly reduce peak hour traffic volumes.

B. Day Care.

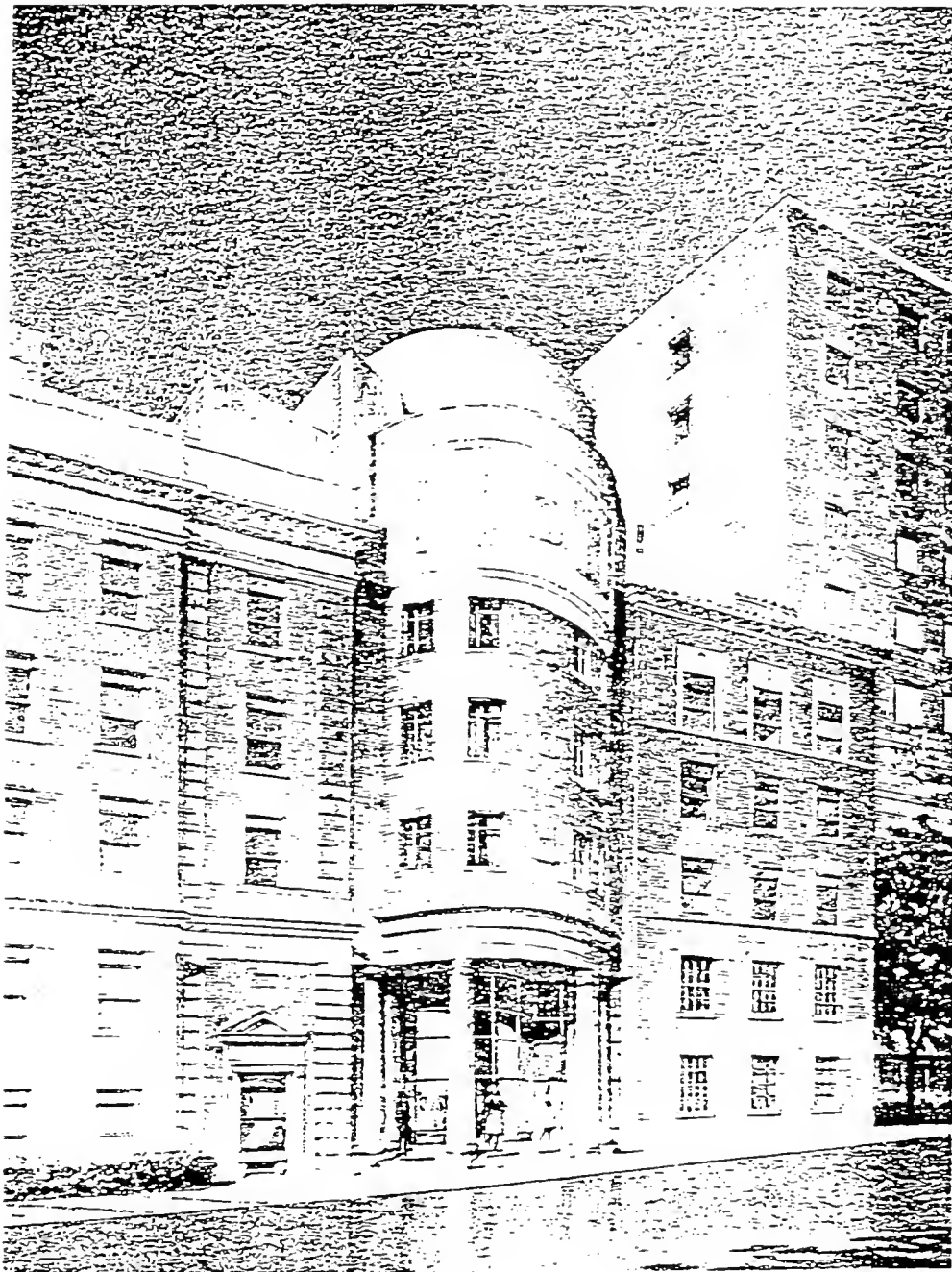
The Hospital recently established a day care program capable of providing care to fifty-eight children. Approximately 3,370 square feet of space within the Hospital's Maintenance facility has been renovated to accommodate this program at an estimated development cost of \$350,000. Future development plans require relocation of this day care space into the lower floors of the building at 306 The Riverway or elsewhere on the Deaconess campus in connection with construction of the new research facility at the site of the Maintenance Building.

C. Shields Warren Radiation Laboratory.

The Hospital sold the Shields Warren Radiation Laboratory to the Dana Farber Cancer Center in 1992. However, the Hospital is leasing the facility until such time (up to seven years) as the research programs can be relocated elsewhere. These functions are expected to be relocated to the proposed new research facility.

D. Baker-Palmer Span Addition.

The construction of the new clinical facility has necessitated the demolition of Harris Hall, which formerly contained management offices and clinical support functions. The Hospital gave serious consideration to the construction of a new



NEW ENGLAND DEACONESS HOSPITAL

BAKER-PALMER SPAN ADDITION

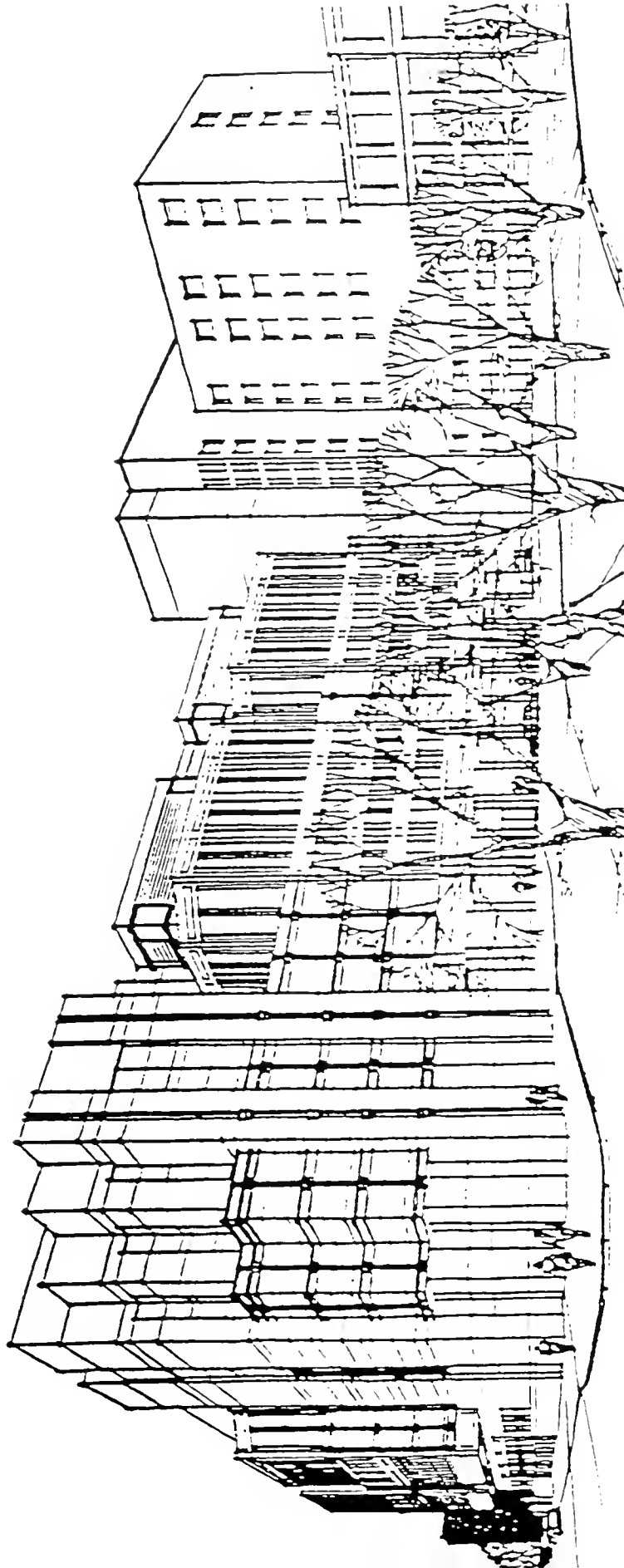
six-story, 52,000 square foot, support facility in the location of the doctors' parking area behind the Maintenance Building, as a means of addressing its support space needs. After careful evaluation, however, the Hospital opted instead to compensate for its loss of support space by constructing three additional floors atop a one-story building between the Baker and Palmer buildings (referred to as the "Baker-Palmer Span") and by leasing three floors in the new MASCO Building at 375 Longwood Avenue for additional support space. This alternative addressed the Hospital's need for support space while maximizing flexibility and minimizing impacts.

Each of the three floors added to the Baker-Palmer Span contains approximately 4,100 square feet, while the fourth level acts as a bridge between the Baker Building and Palmer Building. Construction of this small addition to the building was completed in 1991 in time for relocation of the functions of Harris Hall prior to the start of the new clinical facility. This additional space, along with space leased by the Hospital in the new MASCO Building at 375 Longwood Avenue, helps to alleviate the Hospital's shortage of support space created by the demolition of Harris Hall.

VIII. ON-GOING DEVELOPMENT PROJECTS.

A. New Clinical Facility.

Deaconess is in the process of constructing a new patient care facility located at One Deaconess Road. The new clinical



NEW ENGLAND DEACONESS HOSPITAL

New Clinical Facility

facility will function primarily as an extension of the existing Farr Building clinical facility. It is anticipated that the new clinical facility will contain approximately 250,000 gross square feet (for floor area ratio purposes). It is located primarily in an H-2 zoning district, although the portion of the facility adjacent to Brookline Avenue is within an L-1 zoning district. The floor area ratio of the facility is expected to be approximately 4.5 within the H-2 zoning district and approximately 4.6 within the L-1 Zoning District.

The new clinical facility will be connected to the Farr Building by glass-enclosed, elevated passageways spanning Pilgrim Road at levels 3 through 5 of the new facility above grade and by a tunnel at the basement level. The glass-enclosed, elevated passageways will be stacked one atop the other to minimize visual obstruction and will allow for the circulation of staff, patients and equipment between the Farr Building and the new clinical facility. The new clinical facility will be able to utilize the existing elevator core and support services within the Farr Building due to access created by these passageways.

The construction of the elevated passageways will allow the portion of Pilgrim Road between Deaconess Road and Francis Street to remain open for limited traffic flow in accordance with discussions between the Hospital and the Boston Redevelopment Authority. Pilgrim Road is an internal street within the Deaconess campus that services primarily local Deaconess traffic. This portion of Pilgrim Road will be paved and landscaped and maintained as a private way for public use. Sufficient clearance

between grade and the lowest passageway will be provided for the passage of fire trucks and other emergency vehicles.

In conjunction with the construction of the new clinical facility and the glass enclosed, elevated passageways spanning Pilgrim Road, the Hospital will also add a new entrance and elevator core to the Farr Building adjacent to Pilgrim Road. The new clinical facility will also include a loading area off of Brookline Avenue with sufficient room to allow for trucks to pull off of Brookline Avenue before backing into the loading bays in order to avoid tying up traffic. An ambulance entrance will be constructed on the Pilgrim Road side of the facility, adjacent to the area of the elevated passageways.

The total project cost for the new clinical facility is expected to be approximately \$130,000,000. It will generate approximately 200 construction jobs. Construction commenced in May of 1992 and should be completed by late-1994. The Hospital has agreed to make linkage payments to the City in excess of \$1,000,000 in connection with construction of the new facility.

Generally, diagnostic and treatment functions will be upgraded and relocated into the new clinical facility. Approximately 108 intensive care and medical/surgical beds will be located in the new facility. Space within the Baker, Deaconess, Palmer and Farr Buildings will be devoted primarily to in-patient and ambulatory care functions including out-patient offices, clinics, rehabilitation units, therapy centers and a pharmacy.

The purpose of the new clinical facility is to alleviate existing overcrowded conditions in the Hospital's primary care

facilities. The new clinical facility will provide the necessary space for the efficient realignment and operation of the Hospital's existing programs and departments. It is not intended as an expansion of the Hospital's programs and therefore will not require a net increase in Hospital personnel or create the need for a significant amount of increased parking or other support functions.

The proposed new clinical facility will address several of the most pressing deficiencies and needs identified through the Hospital's planning process. The new facility will permit the modernization and consolidation of critical clinical programs. Moreover, the relocation of programs from other buildings to the new facility will allow for the better utilization of space in those buildings. The new facility will provide for the following benefits:

- (1) A consolidated single-level surgical suite equipped with adequate post-operative and support areas;
- (2) A consolidated single-level radiology suite equipped with adequate utility services and support, storage and teaching areas;
- (3) The relocation of in-patient medical-surgical beds from undersized rooms in the older Baker and Palmer Buildings to new adequately sized rooms;
- (4) More space in replacement medical-surgical and intensive care rooms for modern monitoring and life support equipment, and better accommodation of teaching and residency programs;
- (5) More effective clustering of departments and patients and increased efficiency in the delivery of health care services;
- (6) Easing of overcrowded conditions in storage areas, nursing stations and other support areas;
- (7) Potential for future construction of medical research space; and

- (8) A new, more visible and inviting main entrance to the Hospital on Deaconess Road adjacent to Joslin Park.

B. Renovation of Existing Clinical Space.

The realignment of the Hospital's programs and departments that will be made possible by the new clinical facility will also be accompanied by the upgrading of the Hospital's existing clinical space. Approximately 80,000 gross square feet of space in the Palmer, Baker, Farr and Deaconess Buildings will be available for re-utilization due to the relocation of radiology, surgery, intensive care and medical/surgical beds and other functions into the new clinical facility.

The Deaconess is presently devising a plan for the reuse of this space. During 1995 and 1996 approximately 23,000 gross square feet of the vacated space in the Farr Building will be renovated to accommodate the Blood Bank and the Cardiac Invasive and Non-Invasive Units. These units will be relocated from their current locations in the Deaconess Building so they will be in closer proximity to the operating rooms and medical surgical units in the new clinical facility. In 1995 and 1996 the Deaconess also plans to completely renovate two in-patient floors of the Farr Building (Levels 5 and 6), and to upgrade five in-patient floors in the Farr Building (Levels 7-11) by installing sprinklers and improved fire alarms and correcting other deficiencies. Approximately 15,000 gross square feet of the vacated space on Levels 2 and 3 of the Palmer Building will be used to accommodate the displaced in-patient units during the renovation of the Farr in-patient floors. The above described

renovations planned for 1995 and 1996 are expected to cost approximately \$20,000,000.

The long term use of the approximately 60,000 gross square feet of remaining vacated space in the Farr, Baker, Span, Palmer and Deaconess Buildings is under review. It is expected that most of the space will be used to create adequate space for existing in-patient departments that are operating in spaces that are too small, poorly laid out and fragmented. Ten thousand to twenty thousand gross square feet of the vacated space may be renovated for ambulatory care functions to allow for adequate space for existing ambulatory programs rather than for expansion. No timetable has yet been estimated for these renovations, which are estimated to cost \$25,000,000 to \$30,000,000. As no expansion in the number of beds and only minor expansion in ambulatory care programs is under consideration, no significant traffic, parking or other external impacts are anticipated from these on-going renovation programs.

C. Renovations to 306 The Riverway.

As discussed above, the Hospital recently has concluded that the need for residential apartments on campus does not support the continued operation of the 38 unit building apartment building at 306 The Riverway solely as an apartment building. The Hospital has identified this 38 unit apartment building for uses displaced elsewhere on campus due to construction activities. Of the 38 existing apartment units, the Hospital proposes to renovate 27 apartments located on the second through

fifth floors of the building into Hospital support office space, replacing offices presently located in the Maintenance Building and temporary adjacent buildings to be demolished in connection with the construction of the proposed new research facility. In addition, four apartment units and two storage areas located on the first floor of the building will be renovated to allow for day care use, also presently located in the Maintenance Building. The sixth and top floor of the building will remain as currently configured with 7 apartment units. Exterior renovations will be minimal, and include the provision of a handicap ramp and canopy to an existing door on the first floor of the building.

The renovation of 306 The Riverway does not encompass any increase in the exterior dimensions of the building and therefore will have little or no effect on the floor area ratio for the site. The purpose of these interior renovations is solely to relocate the existing day care and hospital support office uses from buildings intended to be demolished as part of the new research facility project. The Hospital anticipates commencing renovation of this building in 1994 at a cost of approximately \$750,000.

D. Open Space Projects.

Public open space on the Deaconess campus is provided and maintained by the Hospital at Joslin Park which is located between Joslin Place and Deaconess Road. Joslin Park is landscaped with trees and park benches and provides a refreshing park area and inviting entrance to the Deaconess campus. Signs

identify the park as a public open space. The Riverway parkway and park area also bound the Deaconess campus to the west.

The Hospital's open space is further described below and depicted on Exhibit F (Open Space Plan).

1. Joslin Park.

In connection with the construction of the new clinical facility, agreement was reached with the Boston Redevelopment Authority, the Public Improvement Commission, the Boston Transportation Department, the Boston Civic Design Commission, and the Parks and Recreation Department on a plan to upgrade Joslin Park. These improvements are expected to be made following the completion of the new clinical facility.

2. Park at Corner of Riverway and Autumn Street.

Following completion of the new research facility, the temporary MRI building on Autumn Street is expected to be removed and a small park created in its place. The creation of the park will increase open space on the Hospital's campus.

3. New Clinical Facility Lobby.

The lobby of the new clinical facility will contain greenery which will enhance its relationship with Joslin Park located near the entrance.

4. Pedestrian Connector.

If the Hospital locates a new facility in place of the present Deaconess Building, the Hospital intends to provide a pedestrian connection between Pilgrim Road and the Riverway to the extent consistent with the security needs of the Hospital, the need to create hospital building concourses and connections

at upper levels, and the need to create reception and waiting areas adjacent to or within such a pedestrian connection.

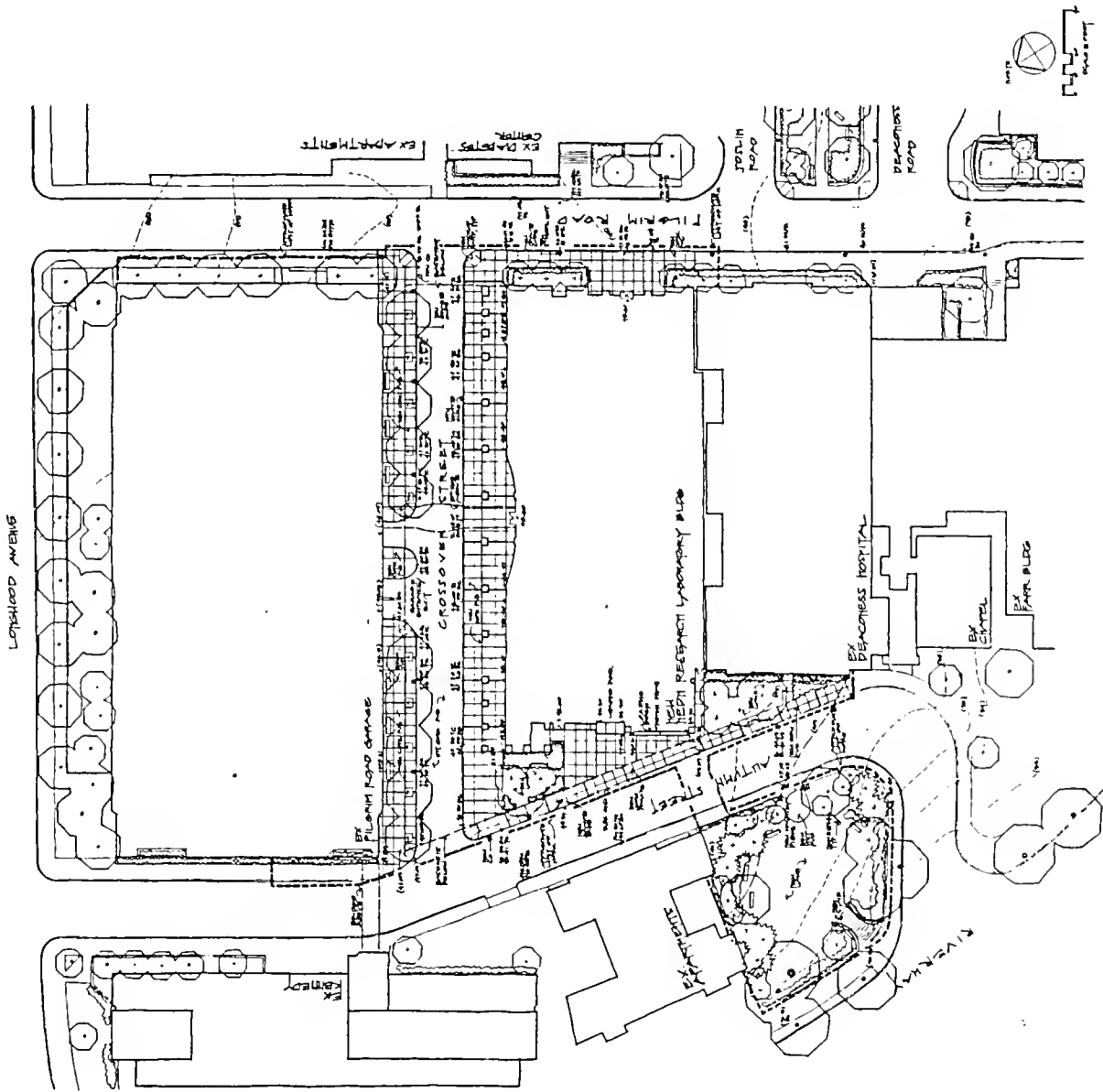
IX. PROPOSED DEVELOPMENT PROJECTS.

A. New Research Facility.

As discussed above, the Hospital has identified a need for up to 400,000 gross square feet of research space by the year 2,000. It is essential that the Hospital have this space to attract and retain physicians and to support the high technology clinical programs which are the primary focus of the institution. Without this research space the Deaconess will not be able to sustain delivery of the tertiary medicine for which it is widely known. Ideally, a significant portion of this space would be located in close proximity to the Hospital's clinical programs, recognizing that off-campus space may be suitable to meet some of the need.

The Hospital has embarked upon a planning process to address a major portion of this need through the construction of a research facility in the current location of the Maintenance Building and temporary office buildings. The 36,205 square foot site is bounded by Pilgrim Road, Autumn Street, and the Hospital's Deaconess Building and Pilgrim Road Garage. The new research building is expected to have a total floor area of approximately 236,740 gross square feet, to consist of eleven stores, and to be approximately 175 feet in height. The research

GENERAL NOTES

[illegible]

- [illegible]

facility will consist of two below-grade levels for an animal research facility and mechanical and support space, and 11 stories above grade, including two levels for office/support space and an auditorium, eight levels of research laboratories, and a mechanical penthouse above the highest occupiable floor. Representative schematic floor plans for the proposed new research facility are attached as Exhibit H.

The facility will encompass substantially all of the site and will have a floor area ratio of approximately 6.6. Some of the chilled water mechanical equipment for the new research facility is expected to be located on top of the adjacent existing garage, located directly across Crossover Street from the project site. The project will include enclosed pedestrian bridge connectors from the new building to the garage, and from the garage to the Kennedy Building on Autumn Street. The research facility also will be connected to the abutting Deaconess Building, which will require minor infill additions to coherently relate and connect that building to the new research facility.

Construction of such a facility would begin in early 1995, and could be expected to be completed within 24 to 30 months. It would require demolition of the Maintenance Building, removal of the adjacent temporary structures and the relocation of the day care space and office support space within the Maintenance Building, probably to 306 The Riverway. The aggregate space of the structures to be demolished is approximately 38,000 square feet. The estimated project cost of the new research building is \$125,000,000.

Although there are benefits to concentrating as much research space as possible near the clinical programs of the Hospital, the completion of the planning process for the new research facility will include a full evaluation of off-campus alternatives. At the same time the Hospital recognizes that development of off-campus alternatives for research space is largely beyond the Hospital's control and is somewhat speculative at this time. The Hospital's Institutional Master Plan must provide for the creation of adequate facilities to assure that the Hospital's long-term research needs can be satisfied. To the extent that firm, economically viable off-campus options become available, the Hospital will give full consideration to such options as a means of satisfying a portion of its research needs.

A significant portion of the new research space will be used to relocate and consolidate existing research programs which are inefficiently dispersed. The existing CRI Building which is outdated will be demolished. The Shields Warren Research Laboratory has been sold to a neighboring institution. A major portion of the new research building will be used to reallocate space for programs formerly located in the CRI Building, and the Shields Warren Research Laboratory, and to alleviate existing overcrowding and fragmentation of research on and off-campus. Almost 20,000 square feet of space will be devoted to an upgraded animal research facility which will require little if any additional staff. The net number of new permanent employees required by the new research facility is expected to be about 75 people. As discussed in the Transportation Impact Study, the Hospital anticipates that the transportation needs of these added

employees will be met through a combination of public transportation, car-pooling and off-campus parking. Construction of the research facility will generate an estimated 300 construction jobs.

The new research facility will accommodate the Hospital's focus on patient care research and will enable the research scientists to effectively perform their dual roles as researchers and clinicians. This facility is essential to meet the Hospital's research and space needs.

X. ENVIRONMENTAL IMPACTS AND MITIGATION.

The New England Deaconess campus is a self-contained cluster of streets and buildings, essentially isolated from the surrounding community. The campus does not border on any residential neighborhoods and is surrounded largely by other medical uses. Major transportation routes run along the perimeters of the campus and do not penetrate campus boundaries. Secondary streets within the campus carry primarily local Deaconess traffic.

Because of the internalized nature of the Deaconess campus, impacts from construction activity within the campus do not directly affect the surrounding community. The redevelopment of the Hospital's facilities through the specific development projects described above will not displace housing uses and will not negatively impact local residential neighborhoods or the Longwood Medical Area.

The development projects described in this Master Plan are intended primarily to replace and modernize existing deficient facilities. Consequently, the Hospital's proposed projects will create minimum additional demands for housing or services in the area.

Nonetheless, the Hospital recognizes that sound planning must include a careful assessment of the potential impacts on surrounding communities of proposed developments. In Massachusetts, development proposals of any significant size or scope are subject to environmental reviews under the Massachusetts Environmental Policy Act ("MEPA"). MEPA requires identification and discussion of project impacts and alternative development scenarios and provides a forum for public review and comment at an early stage in the planning process. The development proposals discussed in this Master Plan will be subject to MEPA.* The Hospital has carefully analyzed potential impacts and considered possible alternatives.

In considering development alternatives, the Hospital has been constrained by several factors. Off-campus alternatives are extremely limited due to the scarcity of available space, the high costs of such space, and the need to locate patient care functions near existing facilities. One off-campus option that the Hospital has pursued is a new building constructed by MASCO on the Temple Israel property across Longwood Avenue from the

*See the Draft Project Impact Report/Draft Environmental Impact Report for the research facility submitted to the Boston Redevelopment Authority and the MEPA unit of the Executive Office of Environmental Affairs on November 1, 1993 for additional discussion of environmental impacts and mitigation measures, including shadow, infrastructure, water quality and other issues.

Hospital. The Hospital has leased approximately 30,000 gross square feet of space in this building to be used for offices and support functions. The Hospital took occupancy of its space in the MASCO building in January, 1992.

Notwithstanding the MASCO project, the general unavailability of space in the Longwood Medical Area requires that the Hospital focus its development plans on its existing campus. Since on-campus space is also scarce, obsolete facilities must be demolished before new facilities are constructed. Because this modernization process can occur only gradually over time, new facilities must be located and planned to function in concert with existing facilities. To function effectively, the Hospital's new facilities must be woven into the existing fabric of the Hospital's campus.

This section of the Master Plan analyzes the potential impacts that the Hospital's major proposed developments will have on their environment. It discusses the operating and urban design implications that the projects will have and considers possible mitigation measures that could be implemented by the Hospital. It also includes a discussion of the construction impacts of the projects and the mitigation measures that will be implemented to minimize those impacts, and also considers the cumulative construction impacts of the Hospital's proposals with other construction activities in the area.

A. Operational Impacts and Mitigation.

1. New Clinical Facility.

The largest of the Hospital's development projects, the new clinical facility, has completed the MEPA review process. However, even before the MEPA process was undertaken, the Hospital carefully considered available alternatives to arrive at the development program for the new clinical facility.

In considering alternatives for the location of a clinical facility, Deaconess identified the following site selection criteria in an effort to assure that the new clinical facility would address existing deficiencies and function with the Farr Building as an integrated unit.

- Large Footprint: Each of the radiology and surgery departments must be relocated to a larger space on a single floor, thus requiring a building with a sufficiently large footprint.
- Growth: The site must afford the potential for growth of major clinical and medical research facilities in order to keep pace with advancing demand.
- Proximity to Farr Building: The site of the new clinical facility must be functionally adjacent to the existing Farr Building. Neither building will be equipped to function as a separate unit and each will rely on the other for essential equipment, personnel, transport of patients and other support services.

The site of the new facility at the location of Harris Hall was the only site on the Deaconess campus that satisfied all of these criteria. The site allows for a large footprint, the building will be constructed to accommodate future vertical expansion, and its location immediately across Pilgrim Road from the Farr Building combined with the glass-enclosed, elevated passageways between the two buildings will provide for the

necessary circulation of personnel and support services between the two buildings.

Because the size and massing of the new clinical facility will be consistent with surrounding structures, it is not anticipated that it will create significant wind or shadow impacts on the surrounding area. The building will be sufficiently set back from Joslin Park to avoid any increased shadow in the park area.

Because the new clinical facility is intended to alleviate existing overcrowded conditions and is not intended to accommodate any significant expansion in the programs provided by the Hospital, the new facility is not expected to result in a substantial increase in traffic in the area. The levels of service at major intersections near the Deaconess campus will therefore not be significantly affected. Although surface parking spaces adjacent to Harris Hall have been displaced in connection with the project, these spaces were relocated off campus. A more detailed analysis of the effect of the new clinical facility and other Hospital projects on traffic volumes and parking needs is included in the Transportation Impact Study attached as Appendix A.

Although the operation of the new clinical facility is not expected to significantly increase traffic in the area, the Hospital and the City devised a bold mitigation strategy to attempt to improve the existing congested traffic situation on Brookline Avenue. The Hospital has donated a portion of the Hospital's land along Brookline Avenue for the addition of a third travel lane southbound on Brookline Avenue between

Deaconess Road and Francis Street. This additional lane will ease traffic congestion along Brookline Avenue and ties into an already existing third travel lane on Brookline Avenue between Francis Street and the Riverway. The Hospital has also granted the City an easement in the surface and subsurface areas of the sidewalk adjacent to this travel lane for the maintenance of fire hydrants and other utilities.

2. Research Facility.

The proposed new research facility, because of its internal location, will not create any significant impacts beyond the boundaries of the Deaconess campus. Architectural and engineering consultants have looked at environmental impacts and determined that shadow and wind impacts should not be significant.*

The research facility will house existing research programs and staff expected to be displaced by demolition of the CRI Building, existing research programs and staff currently located in the Shields Warren Research Building and existing research programs and staff relocated from other overcrowded Hospital facilities. The CRI Building (21,083 nsf) contains research programs in infectious disease, organ transplantation, pulmonary medicine, nutrition and pathology. A significant portion of the space within the new research building will be used for an

* See the Draft Project Impact Report/Draft Environmental Impact Report for the research facility submitted to the Boston Redevelopment Authority and the MEPA Unit of the Executive Office of Environmental Affairs on November 1, 1993 for additional discussion of environmental impacts and mitigation measures, including shadow, infrastructure, water quality and other issues.

upgraded animal facility. Also, space will be provided to accommodate an estimated annual growth factor forecast over the next four years, which is based upon past experience, scientific opportunities in the Hospital's areas of major interest and the current space constraints. This growth factor is necessary to allow Deaconess to satisfy the minimum research space requirements of federal grant applications. In the past, grant applications have been denied because of inadequate research space. The growth in research space is also necessary for the Hospital to retain its ability to attract leading physicians whose federal grants require available research space.

The new research facility will provide approximately 158,000 nsf of space, of which roughly 18,000 to 22,000 nsf will be devoted to an auditorium, conference rooms and office space supporting uses which include, but are not limited to, research. The net increase in actual research space will be approximately 48,000 nsf and would meet the projected research space needs of the Hospital by 1999, based on the forecasted rate of growth.

Chart 4

NEW RESEARCH BUILDING

Floors	Approx. NSF per Floor	Total Approx. NSF
11 floors above ground	12,100	133,100
2 floors below ground	12,100	24,200
Total Approx. NSF		157,300

Floors	Use
Basement and Sub-Basement	Animal Resource Center; Accessory Uses; Mechanical
Floors 1-2	Public Floors; Offices; Auditorium
Floors 3-11	Research Laboratories; Offices

Program Area	Approx. Current Space	Approx. Projected Space
AIDS and Infectious Disease	18,700 nsf	28,000-31,000 nsf
Transplantation	7,000 nsf	16,000 nsf
Cancer	4,500 nsf	9,000 nsf
Cell Growth and Development	15,000 nsf	19,000-21,000 nsf
Coronary Vascular Disease	11,000 nsf	18,000 nsf
Outcome Research/Clinical Trials	1,650 nsf	5,000 nsf
Other Research Programs	18,500 nsf	20,000-25,000 nsf
Animal Resource Center	8,000 nsf	22,000 nsf
Public Areas/Auditorium/Offices	7,000 nsf	18,000-22,000 nsf
Total	91,350 nsf	157,300
*These are estimated figures based on consideration of scientific opportunity in each program; each estimated figure therefore may vary slightly from actual figures based upon occupancy.		

It is projected that at the time of occupancy in 1997, there will be approximately 20,000 nsf of unoccupied but available space for the projected growth to occur over the ensuing two years. This space would be temporarily used for

support activities which, at appropriate times, would be relocated elsewhere.

In the selection of its programs, the Hospital remains cognizant that while the results of basic research are intrinsically valuable, there is also value to continuing to develop research programs which most directly complement the patient-care goals of the Hospital. That is, some research programs more readily complement the role of the Deaconess as a tertiary referral teaching hospital for this community than others. Thus, the Hospital is including in its programs anticipated growth in clinical trials and outcome research. Expansion of Deaconess research programs will also involve the addition of a stronger and larger contingent of laboratory researchers who can support clinically oriented investigators and who can provide an interface between clinical strengths and the basic science programs of neighboring institutions. While the Hospital traditionally has maintained clinical programs of strength and diversity it has been limited in its ability to pursue new approaches because of a lack of the basic science back-up required to bring studies to the stage of clinical application. The proposed expansion of the Deaconess research programs will enable the Hospital to provide this basic science back-up.

The proposed research facility is not expected to generate a significant volume of new traffic as plans are already underway to provide off campus parking with shuttle service for any increase in personnel. Also, as noted in the Transportation

Impact Study, the Hospital has developed a very aggressive policy to encourage the use of public transportation. The new research building project has been reviewed by the Boston Transportation Department. A draft Transportation Access Plan Agreement ("TAP Agreement" has been prepared and includes mitigation measures and provisions for the proposed project. A TAP Agreement satisfactory to the Commissioner of the Boston Transportation Department will be executed prior to the issuance of a building permit for the construction of the new research facility.

An alternative location for construction of the research facility which was considered by the Hospital was along Brookline Avenue at the corner of Francis Street, in the former location of a gasoline service station. This building would have been an extremely visible presence in the Longwood Medical Area. After careful study, the Hospital determined that the proposal for the facility at the location of the Maintenance Building is a more desirable alternative for a variety of reasons. The location of the building internally on the Deaconess campus will reduce any potential impacts of the building on the surrounding areas. The location of this building in close proximity to the entrance to the new clinical facility will also provide the researchers within this building with easy access to the Hospital's clinical programs and departments without adding to congestion on Brookline Avenue.

An Environmental Notification Form ("ENF") was submitted for the Research Facility on July 31, 1991 and was noticed in the Environmental on August 7, 1991 pursuant to the Massachusetts

Environmental Policy Act ("MEPA"). A Certificate of the Secretary of Environmental Affairs on the ENF was issued September 23, 1991 stating that further MEPA review was not necessary. On April 15, 1993, a Notice of Project Change was filed with MEPA to reflect changes to the project including an increase in the gross floor area. The Certificate issued by the Secretary on July 15, 1993 required the submission of an Environmental Impact Report ("EIR").

A single document, serving as a DPIR/DEIR, has been prepared to serve both the City and State review processes, in accordance with MEPA regulations. The report was filed with BRA and EOEa on November 1, 1993. The Authority rendered a Preliminary Adequacy Determination on the DPIR for the new research project on December 17, 1993. The Hospital intends to submit a FPIR/FEIR for the research facility shortly.

3. Other Projects.

None of the other projects described in this Master Plan are expected to generate significant new environmental or operational impacts, as they involve primarily interior renovations.

B. Urban Design.

The visual and urban design implications of each of the proposed projects have been taken into account. The scale and massing of the clinical facility is consistent with other clinical buildings within the center of Deaconess' main campus.

The location of the facility is also consistent with the planning objective of clustering high density, clinical patient case uses in the center of campus. Visually, the new clinical facility will improve the appearance of the retail block along Brookline Avenue and will enhance the overall image of the Hospital to the public.

The exterior of the Kennedy ambulatory care building has not been changed and therefore the basic characteristics of the building and its compatibility with surrounding structures has not been affected. Landscaped public sidewalks and signage identify the building and provide an inviting public access to the building.

The new research facility has been favorably reviewed by the Boston Civic Design Commission which approved the Project's design on August 3, 1993. The schematic design for the new research facility has been approved by the BRA design staff. Further plans and specifications for the research facility will be submitted to the Authority for approval in accordance with the Authority's "Development Review Procedures," 1985, Revised 1986.

Materials and treatment of the research facility, open space, and the size, location, design, color materials of exteriors will be submitted and approved in accordance with the Authority's design development review requirements. Landscaping will be provided to the exterior of the building and tree-lined sidewalks will be maintained. As part of the reconstruction of Crossover Street (a private way), the Hospital has agreed to construct new sidewalks, plantings, benches, and lighting along

the front of the Pilgrim Road Garage. Improvements to the sidewalks along Pilgrim Road and Autumn Street will include similar treatment. In addition, following the completion of the research facility, the temporary MRI building on Autumn Street is expected to be removed and a small park installed in its place. The creation of the park will increase open space on the Hospital's campus.

The Hospital's proposed development projects will improve the pedestrian quality of the Hospital's campus. Upgraded buildings that are appropriate to the scale and character of Boston will replace older Hospital buildings. This will also improve the character of the nearby Riverway. Landscaping improvements proposed for Joslin Park, the limited-access portion of Pilgrim Road and elsewhere on the campus will create a more inviting atmosphere for pedestrians. Signage for pedestrian traffic and more visible entries will also assist pedestrian and vehicular traffic flows.

C. Construction Impacts and Mitigation.

A thorough analysis of construction impacts must be conducted as part of the MEPA and BRA review processes before any project gets final approval to commence construction. In anticipation of this analysis and as part of its master planning process, the Hospital has already attempted to identify any potential impacts of its proposed construction projects.

Construction impacts from the proposed projects are not expected to be significant. The primary impacts will be construction traffic and construction noise. With proper management, these impacts can be kept to a minimum.

The largest of the proposed projects, the new clinical facility, will create the largest number of construction management issues. However, because there is no residential area in the vicinity of the new facility, noise and traffic impacts on residential neighborhoods will not be a problem. Construction traffic will be managed to minimize the use of main roads by construction vehicles during peak volume times. Deliveries to the construction site will occur at off peak times and construction workers will park in off-campus lots. Dust from demolition and construction activities will be minimized using conventional wetting and other construction techniques.

Pedestrian traffic on Brookline Avenue will be rerouted around the construction site and will be managed to minimize disruptions. Staging will be placed in non-pedestrian areas whenever possible. No staging will be placed in Joslin Park and no direct obstruction of the park will occur due to the construction of the new facility.

Construction noise and traffic impacts from the new research facility will be confined to the interior of the Hospital's campus. The Research Facility will not be located adjacent to a major travel route. Construction can be managed to minimize noise and dust, and to route construction traffic to and from the site during off-peak hours.

D. Cumulative Construction Impacts.

Deaconess has taken into account the potential overlap in construction periods of the Hospital's various project proposals. The renovation of the Kennedy Building and the original construction of the day care space in the Maintenance Building have been completed. The additional floors of the Baker-Palmer Span were completed before the new clinical facility construction started. None of these projects overlapped. The construction of an additional entrance and elevator core onto the front of the Farr Building was completed in preparation for construction of the new clinical facility. Renovations of space within the Farr, Baker, Palmer and Deaconess Buildings will not commence until completion of the new clinical facility. Construction of the new research facility, which is expected to begin in early 1995, will have no overlap with construction of the new clinical facility or the renovation of 306 The Riverway.

The impacts of other projects in the Longwood Medical Area and their relationship to the Hospital's proposals have also been considered. The Hospital's projects will be coordinated with projects being undertaken by Beth Israel, Brigham & Women's and Children's Hospital through monthly construction management meetings.

XI. PUBLIC REVIEW PROCESS.

The Deaconess campus is not located within an urban renewal area and the Hospital has no existing cooperation agreements with the Boston Redevelopment Authority for the redevelopment of its facilities. Nonetheless, every construction project proposed by the Hospital is subject to a wide range of state and local scrutiny.

At the state level, a thorough environmental review of all proposed projects is conducted through the MEPA process. In addition, any proposed capital expenditure of \$7.5 million or more for the construction of a new health care facility or the substantial rehabilitation of an existing facility is subject to extensive review by the State Department of Public Health through the Determination of Need process. This review process ensures that there is a public need for the proposed facility. In making its determination as to the need for a proposed facility, the Department of Public Health considers the financial, physical and programmatic aspects of the project.

On a local level, there are several layers of public review. Large project proposals which qualify as Development Impact Projects under the Boston Zoning Code, such as the new clinical facility and the new research facility, are subject to extensive design review by the Boston Redevelopment Authority. Moreover, because the Deaconess campus is located in an institutional overlay district under the current Boston Zoning

Code, virtually all hospital-related uses under the Zoning Code require the issuance of conditional use permits by the Boston Board of Appeal. The Boston Redevelopment Authority also typically reviews a project in an advisory capacity to the Board of Appeal. Following the Boston Redevelopment Authority's approval of zoning map and text amendments proposed for the Deaconess campus, and adoption of these amendments by the Zoning Commission, the Deaconess campus will be rezoned as the New England Deaconess Hospital Institutional District. Formal review by the Boston Redevelopment Authority will be provided for in those amendments creating the subdistrict. Consequently, any development project proposed by the Hospital would be reviewed by either the Board of Appeal or the Boston Redevelopment Authority. The Board of Appeal review and frequently the Boston Redevelopment Authority reviews include public hearings.

Less formal, but no less meaningful, reviews of projects occur at the neighborhood level. Deaconess is a responsible member of the Longwood Medical Community and MASCO, and realizes the importance of local community input. The Hospital has in recent years met on several occasions with members of the Mission Hill PZAC, Fenway neighborhood groups, and other Hospital neighbors. The Hospital has updated its neighbors on its Institutional Master Plan and specific building proposals as they have been refined during the fall of 1993.

XII. PUBLIC BENEFITS.

The redevelopment of the Hospital's facilities will generate direct and indirect benefits to the Hospital, the surrounding community and the City of Boston as a whole. The physical improvements to the Hospital's campus and the commercial block along Brookline Avenue will improve the functionality and appearance of the Longwood Medical Area. Existing deteriorated commercial space along Brookline Avenue will be demolished and replaced with approximately 5,500 square feet of modern commercial space.

The Hospital's development proposals will also improve the quality of the pedestrian travel environment. The relocation of the Hospital's main entrance to Deaconess Road adjacent to Joslin Park will improve the surrounding context of the park and the public's perception of the Hospital. In addition, the portion of Pilgrim Road between Deaconess Road and Francis Street will be maintained as a private way available for limited traffic flow. Sidewalks will be widened and the pedestrian environment enhanced with plantings and benches.

The Hospital's policies regarding parking, which are included in the Institutional Master Plan could also help to ease traffic congestion in the Longwood Medical Area. Hospital employees are being encouraged to park off-campus and to utilize shuttle service or other forms of public transportation to and from the Hospital. The effect of this policy, combined with the

closure of the school of nursing, is anticipated to be a net reduction in peak hour vehicle trips to the Deaconess campus.

As previously discussed, the Hospital and the City intend to add a third travel lane southbound on Brookline Avenue adjacent to the new clinical facility. The impacts of this measure on traffic congestion on Brookline Avenue could be felt not only in the area of the Deaconess campus, but throughout the Longwood Medical Area.

The Hospital's proposed development projects will also provide substantial economic benefits and opportunities to the Longwood Medical Area and the City of Boston as a whole. Spaces in the new day care facility will be available to residents of nearby communities. Construction activities will create up to 300 construction jobs. The Hospital is providing a comprehensive community benefits package in connection with the new research facility project that includes Housing Linkage of approximately \$1,180,000 and Jobs Linkage of \$236,000. These funds can be targeted toward the creation of affordable housing and housing support services, such as community spaces and day care. Jobs linkage funds can be used to establish job training programs for area residents to teach skills necessary for employment opportunities being created at Deaconess and other area hospitals. The Hospital has proposed to members of the Mission Hill neighborhood that a portion of the linkage funds be targeted for programs to benefit residents of that neighborhood. The Hospital will work with neighbors and neighborhood schools to develop specifics of a job training program.

In addition, the Hospital, in cooperation with the Mayor's Office of Jobs and Community Services, will identify existing education and training programs serving the community and maximize resources by coordinating, and in some cases, integrating programs. The Hospital will continue to work with the local community to increase the number of Hospital employees from the local community, and will target qualified community residents for new employment opportunities, and will target current employees from the local community for skills upgrading opportunities. In addition, a PILOT payment amount and schedule is currently being negotiated with the City of Boston Assessing Department. The community program benefits to be undertaken by the Hospital in connection with the new research facility is described in Exhibit G.

The specific development proposals described in this Institutional Master Plan will help to ensure the Hospital's continued ability to deliver first-rate health care service. The Hospital has a world-renowned reputation for medical research in such critical areas as AIDS, cancer and diabetes. The location of a health care and medical research institution of such high caliber in the immediate vicinity is a valuable resource for residents of the Boston area. It stimulates growth and creates job opportunities in the medical field and in the many support industries that service medical institutions. A hospital of Deaconess' stature attracts quality professionals and medical personnel into the area. It enhances the reputation of the City

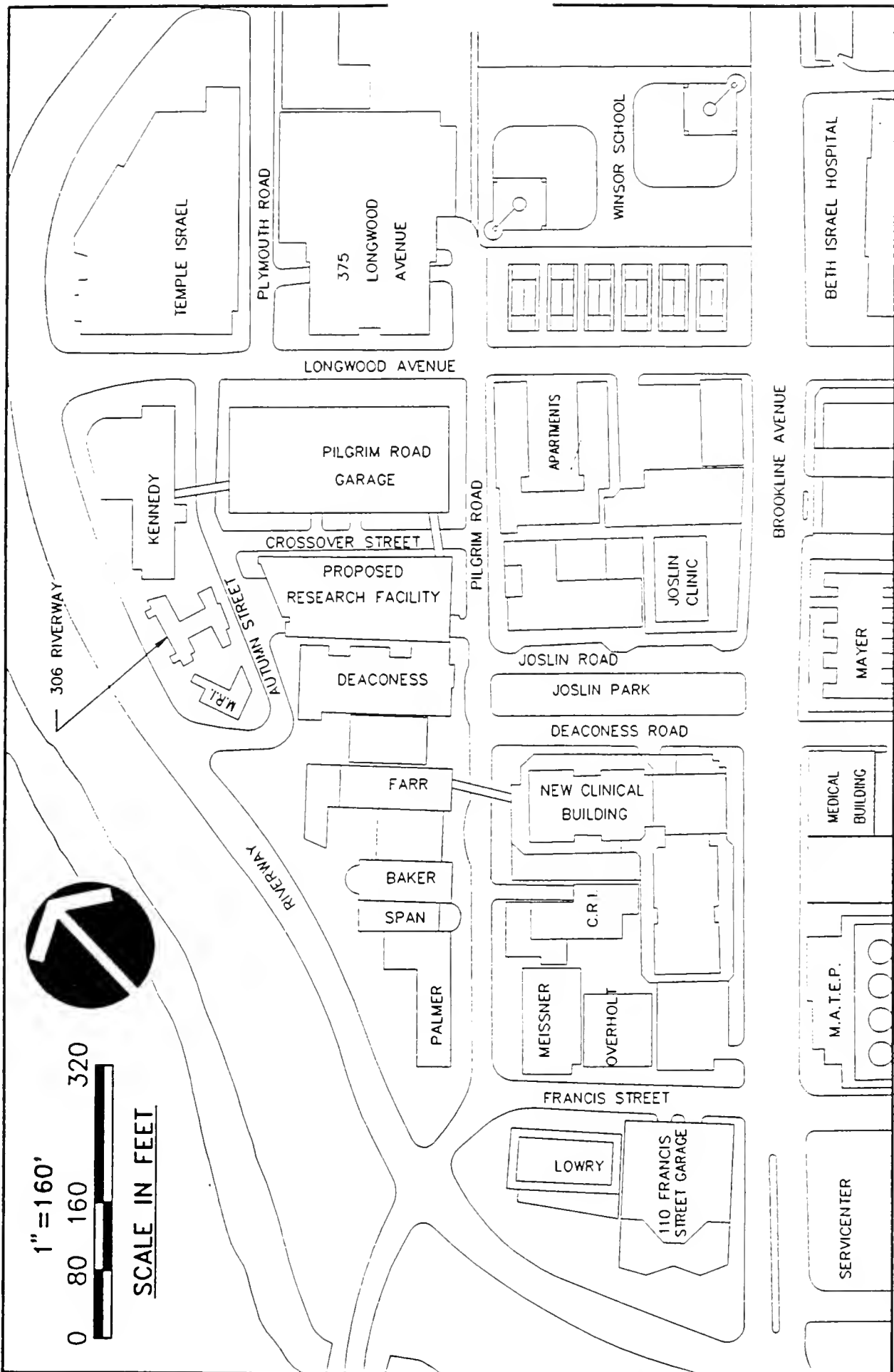
of Boston as a modern and sophisticated city and a center for higher learning and research.

As described earlier in Section II.D of this Master Plan, the Hospital has taken an active role in bringing affordable health care to surrounding communities, and has played an integral part in Boston's medical community at large. The projects described in this Master Plan will enable the Hospital to continue in these roles and to address the medical needs of Boston area residents into the twenty-first century.

XIII. CONCLUSION.

New England Deaconess Hospital's Master Plan attempts to anticipate the Hospital's direction over the next ten years; however, preliminary planning for the period well beyond that horizon has already begun. The Hospital will continue to re-evaluate its needs and resources in an ongoing effort to maintain its status as a primary referral and teaching medical institution. The Hospital will update and resubmit this master plan periodically after this submission. The Hospital is prepared to do its part in contributing to the improvement of conditions within the Longwood Medical Area and in responding to the needs of the local communities.

EXHIBITS



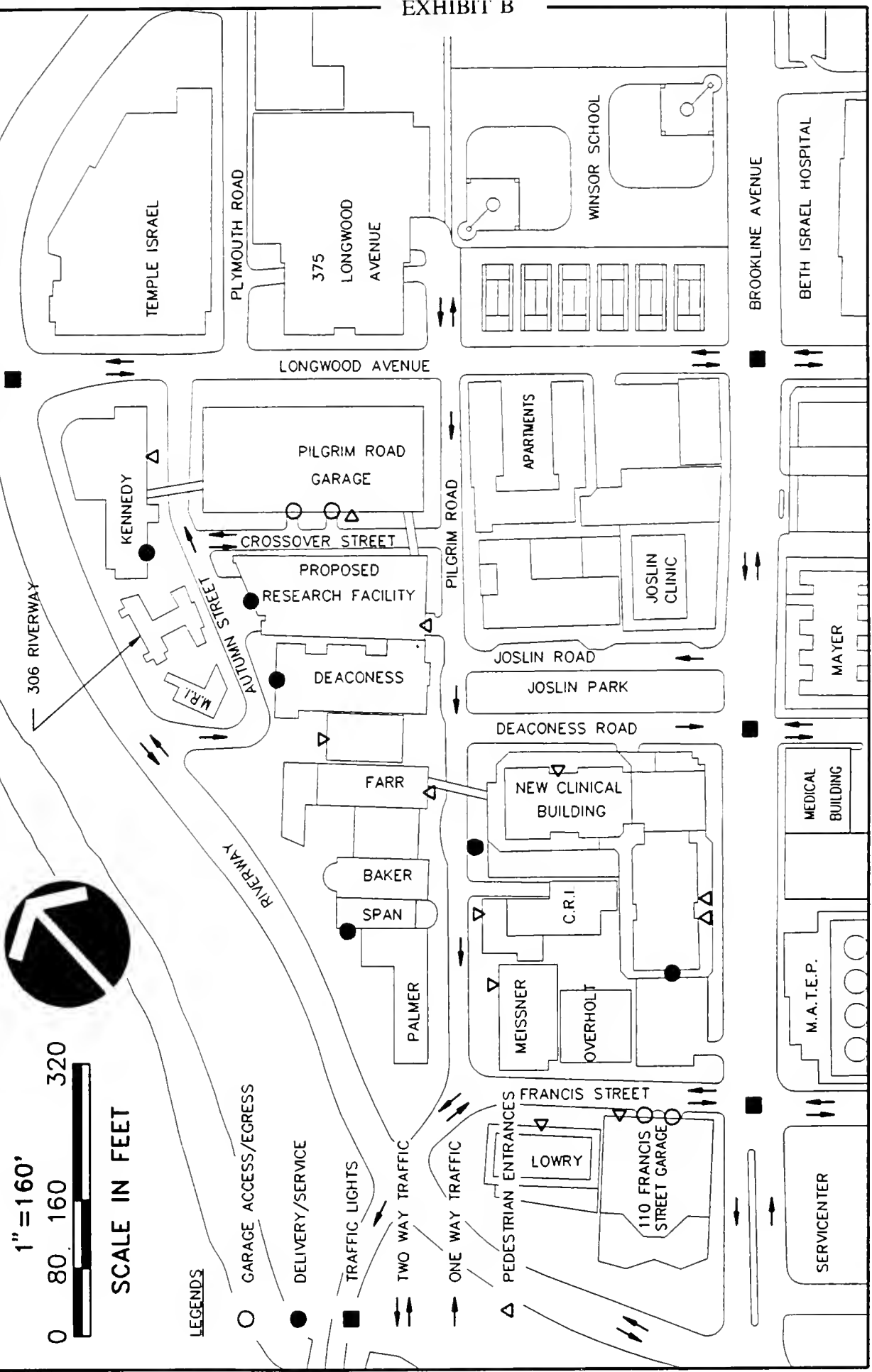
CAMPUS PLAN
NEW ENGLAND DEACONESS HOSPITAL RESEARCH FACILITY



SCALE IN FEET




LEGENDS

- GARAGE ACCESS/EGRESS
- DELIVERY/SERVICE
- TRAFFIC LIGHTS
- TWO WAY TRAFFIC
- ONE WAY TRAFFIC
- PEDESTRIAN ENTRANCES



PROPOSED SITE CIRCULATION
NEW ENGLAND DEACONESS HOSPITAL RESEARCH FACILITY

Parking

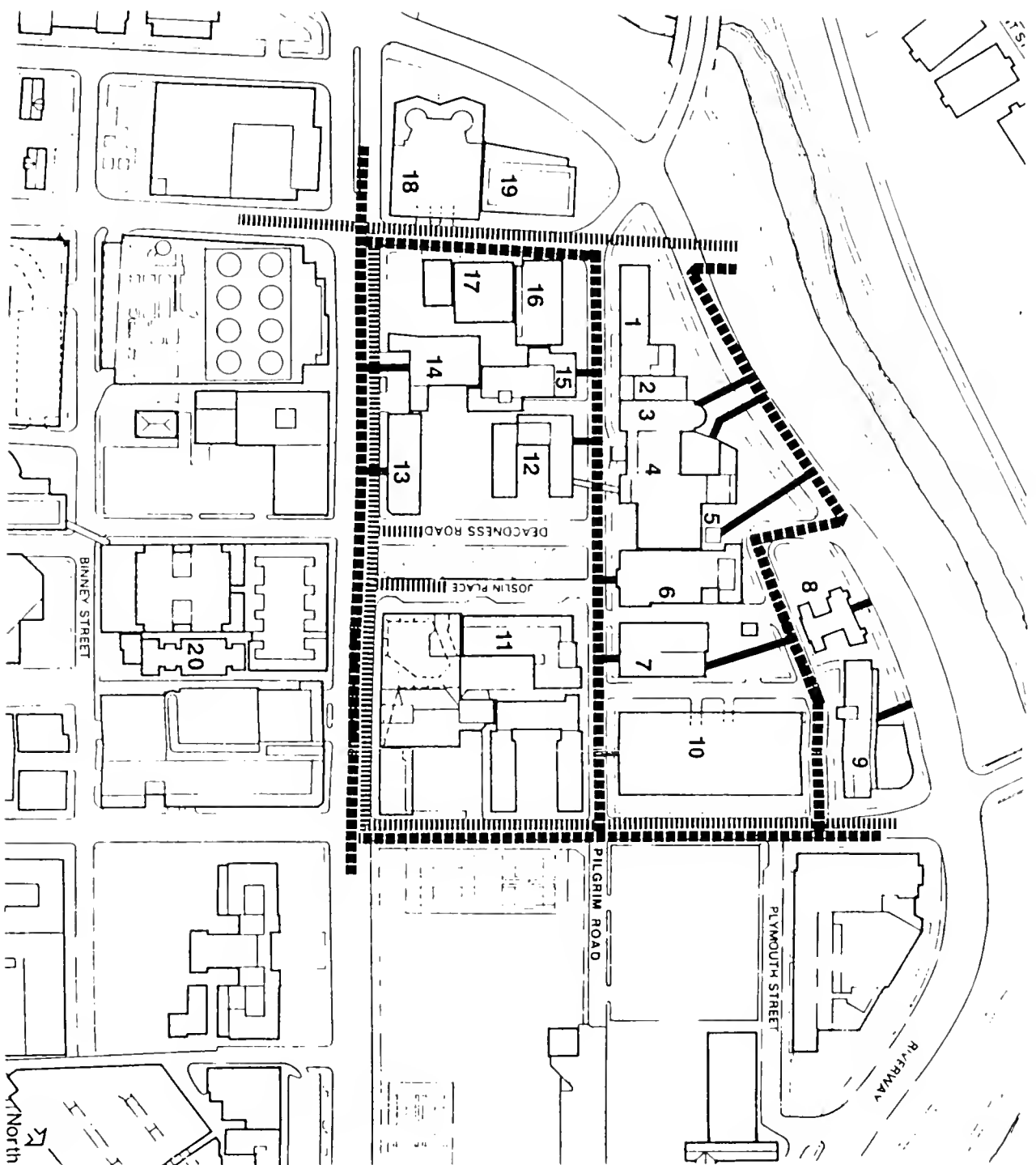
 On Grade Parking
 Parking Garage
 Metered

Building Key



1 PALMER
2 COMPUTER
3 BAKER
4 FARR
5 CHAPL
6 DEACONESS
7 MAINTENANCE
8 APARTMENTS
9 KENNEDY
10 PARKING
11 JOSHUA
12 HARRIS
13 COMMERCIAL
14 STORAGE
15 CRI
16 MESSNER
17 OVERLOOK
18 PARKING
19 LOWRY
20 SHIELDS WAR

PAYETTE ASSOCIATES/M HOSHIN ASSOCIATES

$$0 \rightarrow H^1(X, \mathbb{Z}) \rightarrow H^1(X, \mathbb{R}) \rightarrow H^1(X, \mathbb{C}) \rightarrow 0$$



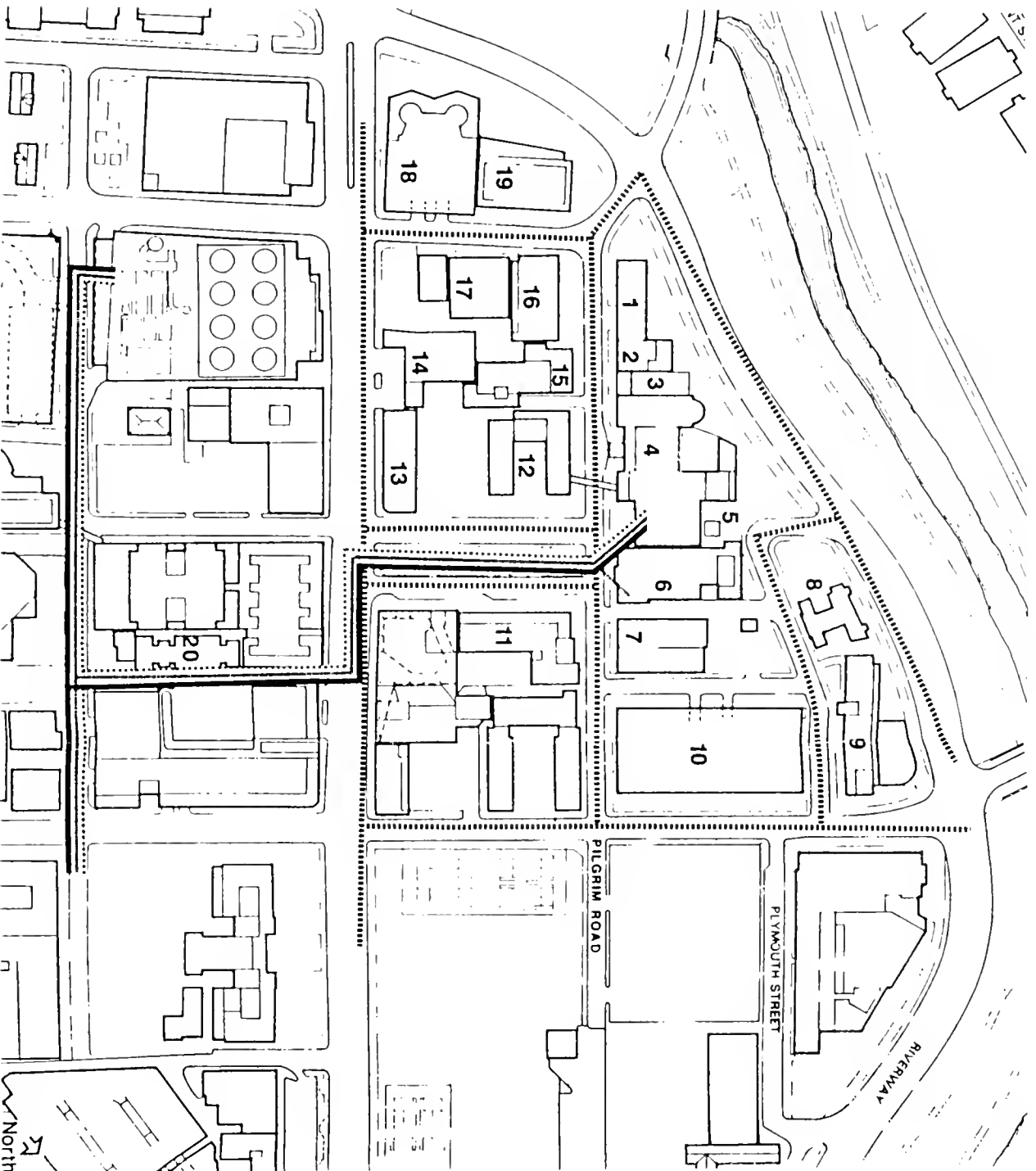
Sewer System

-  Old System
-  More Recent System





 Building Key

- 1 PALMER
- 2 COMPUTER
- 3 BAKER
- 4 FARR
- 5 CHAPEL
- 6 DEACONESS
- 7 MAINTENANCE
- 8 APARTMENTS
- 9 KENNEDY
- 10 PARKING
- 11 JOSLIN
- 12 HARRIS
- 13 COMMERCIAL
- 14 STORAGE
- 15 C.R.I.
- 16 MEISSNER
- 17 OVERHOLT
- 18 PARKING
- 19 LOWRY
- 20 SHIELDS WARREN


PAYETTE ASSOCIATES/M. BOSTIN ASSOCIATES
 0 50 150ft.
 North

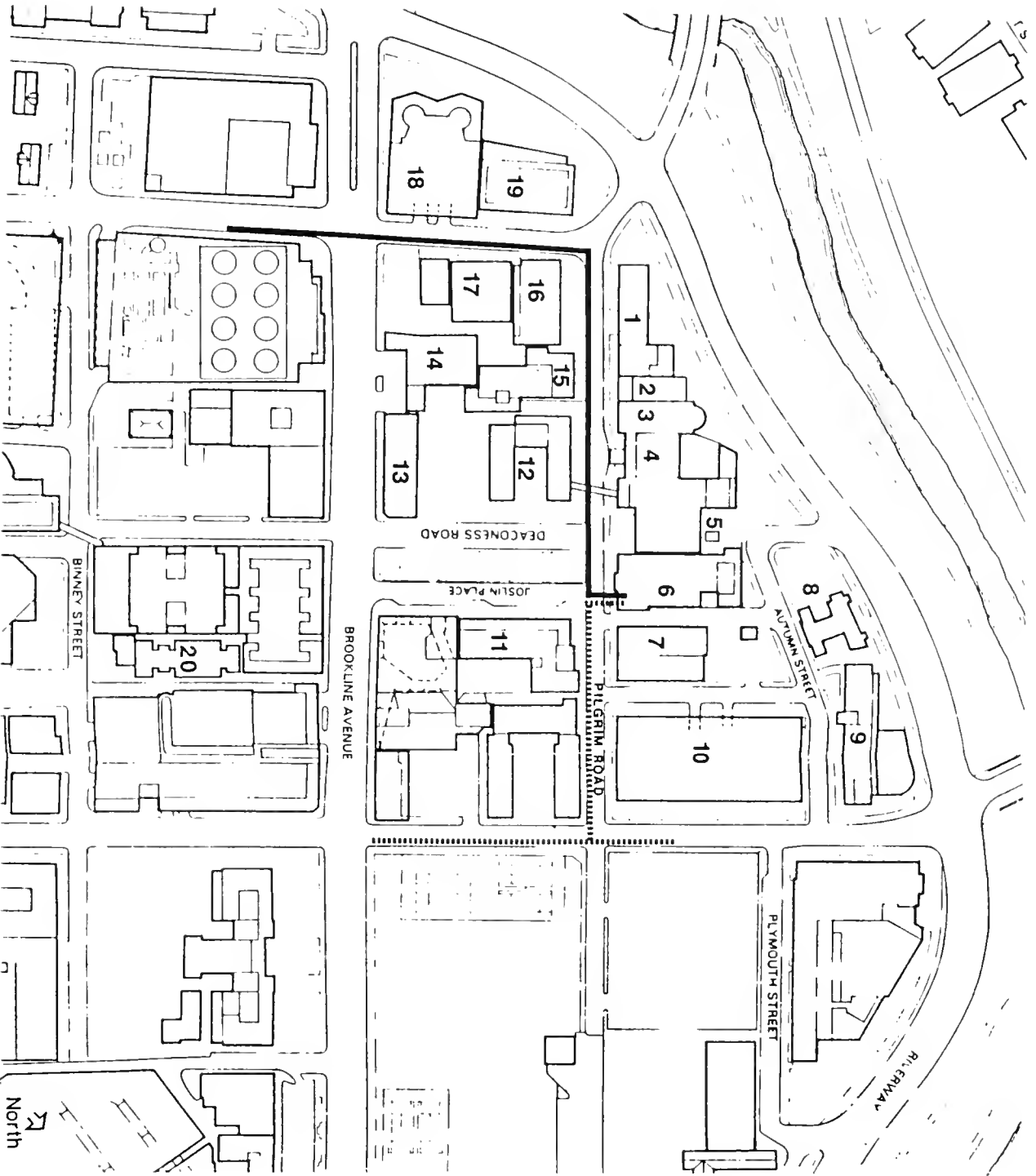


Utility Distribution


-  Water Distribution
-  Chilled Water
-  Steam
-  Oxygen


Building Key

-  Building Key
- 1 PALMER
- 2 COOPER
- 3 BAKER
- 4 FAIR
- 5 CHAPEL
- 6 DEACONESS
- 7 MAINTENANCE
- 8 APARTMENTS
- 9 KENNEDY
- 10 PARKING
- 11 JOSLIN
- 12 COMMERCIAL
- 13 STORAGE
- 14 C.R.I.
- 15 MESSENGER
- 16 OVERHOLT
- 17 APARTMENTS
- 18 LOWRY
- 19 SHIELDS
- 20 WARREN



Utility Distribution

 Future 15KV
MATEP Electrical Service

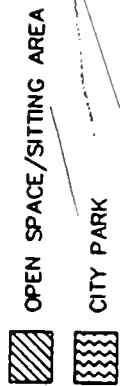
 Present 15KV
Edison Electrical Service

Building Key

- | | |
|---------------|---------------|
| 1 PALMER | 11 JOSTLIN |
| 2 COMPUTER | 12 HARRIS |
| 3 BAKER | 13 COMMERCIAL |
| 4 CHAPEL | 14 STORAGE |
| 5 DEACONESS | 15 MEISSNER |
| 6 MAINTENANCE | 16 OVERHOLT |
| 7 APARTMENTS | 17 PARKING |
| 8 KENNEDY | 18 LOWRY |
| 9 SHIELDS | 19 WARREN |
| 10 PARKING | 20 SHIELDS |



SCALE IN FEET



306 RIVERWAY

RIVERWAY PARK

KENNEDY

AUTUMN STREET

PROPOSED RESEARCH FACILITY

PILGRIM ROAD GARAGE

CROSSOVER STREET

DEACONESS

FARR

BAKER

SPAN

PALMER

PEDESTRIAN STREET

MEISSNER

C.R.I.

OVERHOLT

NEW CLINICAL BUILDING

DEACONESS ROAD

JOSLIN PARK

JOSLIN ROAD

JOSLIN CLINIC

APARTMENTS

PILGRIM ROAD

LONGWOOD AVENUE

375 LONGWOOD AVENUE

PLYMOUTH ROAD

TEMPLE ISRAEL

WINSOR SCHOOL

BROOKLINE AVENUE

SERVICENTER

M.A.T.E.P.

MEDICAL BUILDING

MAYER

BETH ISRAEL HOSPITAL

LOWRY

110 FRANCIS STREET GARAGE

FRANCIS STREET

OPEN SPACE PLAN
NEW ENGLAND DEACONESS HOSPITAL RESEARCH FACILITY

DEACONESS HOSPITAL

NEW RESEARCH BUILDING

November 17, 1993

Job Training and Permanent Employment - Deaconess Hospital will work on a partnership basis with the local neighborhood residents to undertake the following initiatives:

- * Deaconess Hospital will work with the local community and city agencies to develop a job creation proposal to serve the residents of the local community that coordinates with other LMA employment and training initiatives using the job linkage funds from the project, currently estimated at \$236,000.
- * Deaconess Hospital will target current employees from the local community for skills upgrading opportunities.
- * Deaconess Hospital will target new employment opportunities to qualified community residents.
- * Deaconess Hospital commits to increasing the number of employees from the local community and to working with appropriate people in the community to accomplish this objective.
- * Deaconess Hospital will designate a staff person to coordinate training and recruitment efforts.
- * Deaconess Hospital will distribute notices of available positions on a regular basis to locations to be agreed upon by the community. In general, notices will be distributed before ad is placed in newspaper.
- * Deaconess is willing to explore in conjunction with other institutions and community groups ways of expanding the methods by which neighboring residents are informed and advised of employment positions available.
- * Deaconess Hospital will participate in job fairs to create awareness of employment opportunities.
- * Deaconess Hospital will coordinate and integrate with the City of Boston's existing job training programs to enlarge the pool of prospective employees from the local neighborhood.
- * Deaconess Hospital will offer counseling sessions for potential employees.
- * Deaconess Hospital will use the services of local community agencies, such as the Private Industry Council, as a source of referrals for employment opportunities and to increase the representation of local neighborhood residents in the applicant pool for employment at the Hospital.

EXHIBIT G

- * Deaconess Hospital will submit a Boston Residents Construction Employment Plan to describe its proposed procedures to meet the goals of the Boston Residents Job Policy for persons employed by Deaconess Hospital in the construction of the project. Deaconess Hospital submitted such a plan for its clinical building.

Neighborhood Residency

- * Deaconess Hospital will work with the appropriate parties to develop a specific housing proposal to promote neighborhood stabilization and home ownership opportunities using the housing linkage funds from this project, currently estimated at \$1,180,000.
- * Deaconess Hospital will participate in the Walk-to-Work program that may be established by MASCO for area-wide implementation in the LMA, including the following:
 - Deaconess Hospital will disseminate informational pamphlets and materials about the local neighborhood including housing opportunities. Available materials will be incorporated into employee orientation packages and will be presented to department heads;
 - Deaconess Hospital will make information on housing opportunities in the local neighborhood available to its employees through postings and other marketing strategies. Specific bulletin board space will be made available for Walk-to-Work housing opportunities;
 - Deaconess Hospital will allow community members to post housing opportunities on a bulletin board located at the Hospital;
 - Deaconess Hospital will maintain a list of realtors, non-profit housing owners, apartment managers and other property owners in an effort to help employees locate housing in the local neighborhood.
- * Deaconess will communicate with its employees in a variety of ways about housing opportunities in the local neighborhood.

Transportation

- * Deaconess Hospital will continue to support MASCO's LMA-wide traffic mitigation programs.
- * Deaconess Hospital will promote increased transit ridership by persons in the Project as follows:
 - Deaconess Hospital provides for the sale of MBTA passes and subsidizes 40% of the cost of MBTA passes for Deaconess Hospital employees;

EXHIBIT G

- Deaconess Hospital will provide public transportation promotional materials to persons working on the Project.
- * Deaconess Hospital will tell contractors on the Project that parking in the LMA will not be available for construction workers.
- * Deaconess Hospital has created a Commuter Mobility Plan for the Hospital in cooperation with MASCO and the Boston Transportation Department which includes the promotion and subsidization of ridesharing and car and vanpooling opportunities.

Purchasing and Contracts

- * Deaconess Hospital will encourage the procurement of goods and services from local businesses by making use of local business directories that may be generated by the BRA, MASCO, or the community.
- * Deaconess Hospital in partnership with MASCO and other LMA institutions will hold a business services fair on an annual basis to let vendors and small businesses present their goods, and will participate in workshops designed to introduce local vendors to the business practices of LMA institutions.

Pilot Payments

- * Deaconess Hospital will be discussing PILOT payments for the Project with the City Tax Assessors.

Progress Reports

- * Deaconess Hospital will provide a report on a biannual basis of progress implementing the cooperation agreement approved in conjunction with this project. Progress reports will include the number of people from the local community employed by the Hospital.

Other Community Services

- * In addition to the above project-related community benefits, Deaconess Hospital will continue its support of and participation in efforts to serve the people of the local neighborhood and the City of Boston. For example, the Hospital has:
 - Supported several community health centers, including:
 1. Fenway Community Health Center
 2. Mattapan Community Health Center
 3. Roxbury Comprehensive Community Health Center
 4. Whittier Street Neighborhood Health Center
 - Supported the Mission Possible Summer Program, which provides recreational, educational, and employment opportunities for the young people of Mission Hill;

EXHIBIT G

- Supported Mission Hill Sports Camp;
- Participated in the LMA/Mission Hill/Fenway Food Project, which provides emergency food assistance and nutrition program support to individuals and organizations in the local neighborhood;
- Supported Mission Hill Neighborhood Housing Services;
- Participated in Health Fair sponsored by Gloucester Memorial Church and Mission Hill community;
- Supported Mission Hill Community Center's voter registration drive;
- Supported and participated in Fenway Development Corporation's 20th Anniversary Celebration;
- Participated in the Private Industry Council's Summer Jobs Program and Project ProTech -- aimed at exposing students to careers in healthcare.

EXHIBIT H

GENERAL NOTES

REVISIONS

KEY PLAN

DATE: 10/10/91 BY: [Signature]

Deaconess Hospital

Research Laboratory Building

Generic Floor Plan Type 1 Laboratory

A1-15

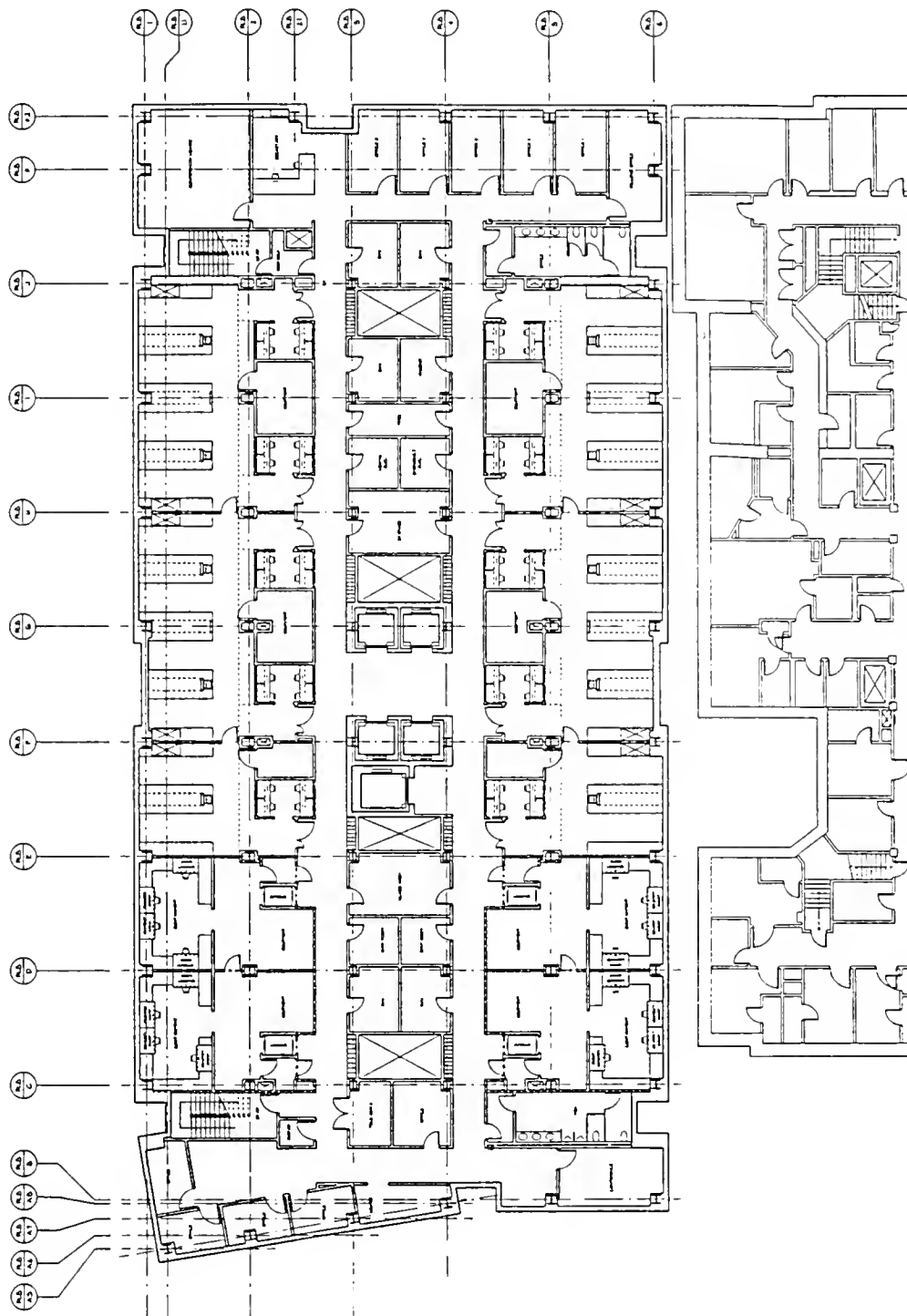


EXHIBIT H

GENERAL NOTES

REVISIONS

KEY PLAN



DATE: 10/10/01 BY: [Signature]

Deaconess Hospital

Research Laboratory Building

No. 1-Genetic 1 Floor Plan

A1-1.7

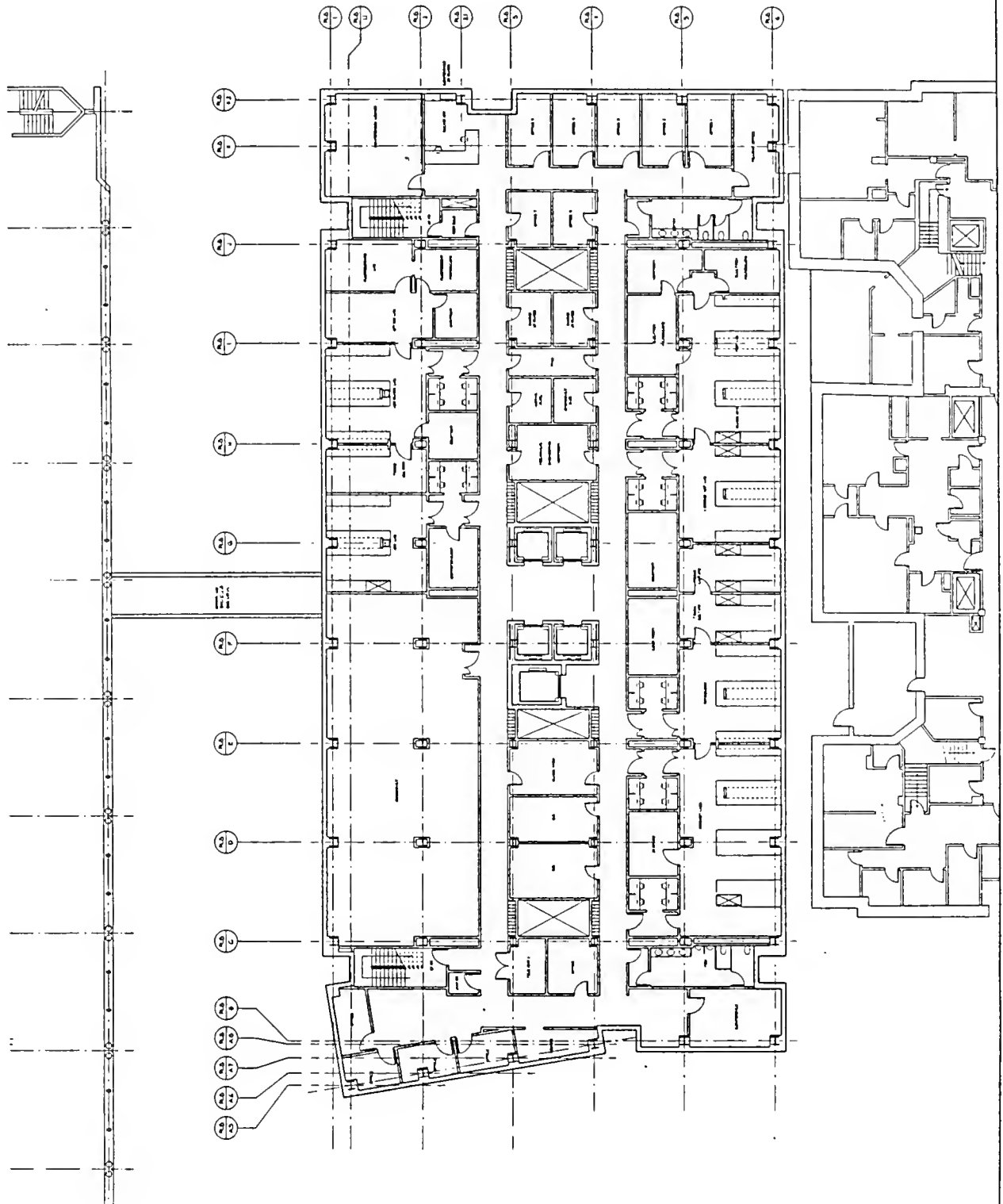


EXHIBIT H

GENERAL NOTES

REVISIONS

KEY PLAN



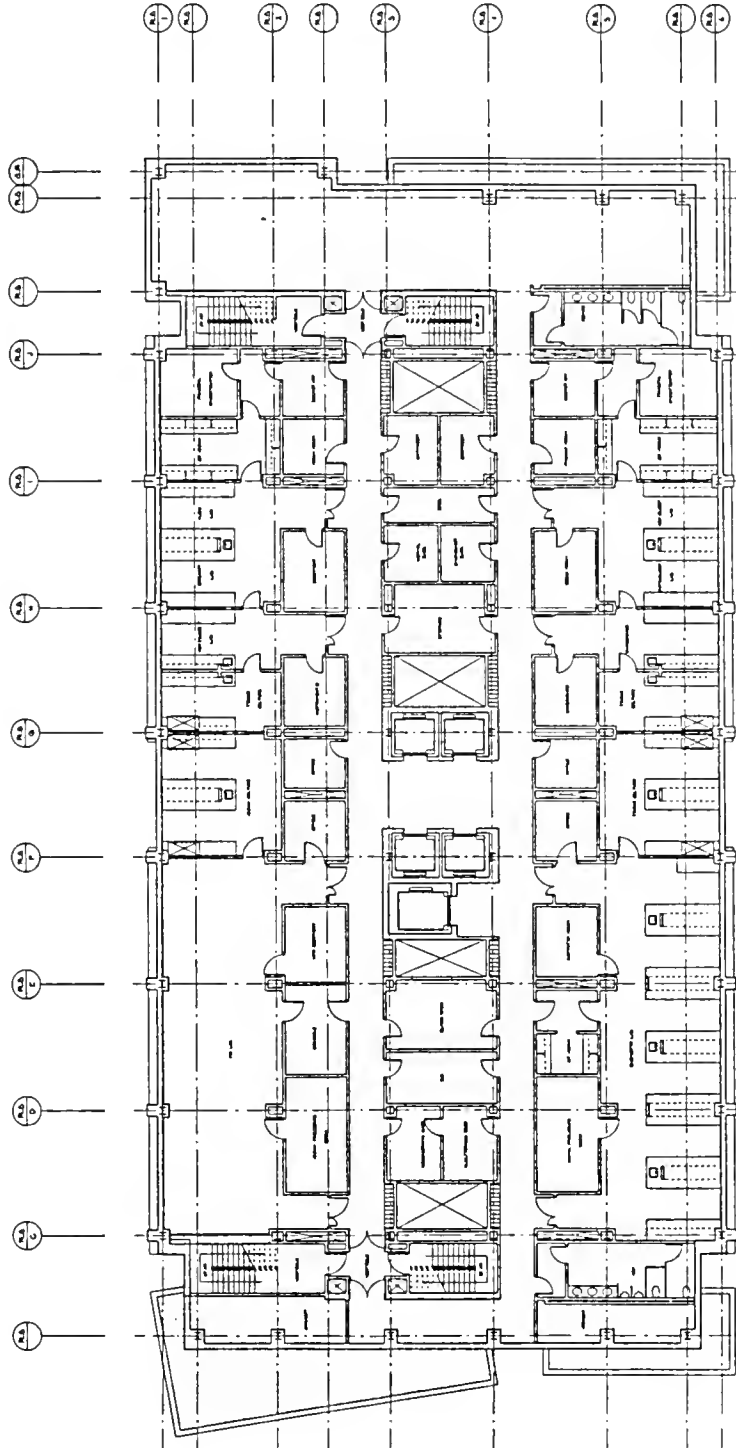
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BY: [Signature]
CHECKED: [Signature]
APPROVED: [Signature]

Deaconess Hospital

Research Laboratory Building

Non-Genetic 2 Floor Plan

A1-18



APPENDIX A

APPENDIX A

INSTITUTIONAL MASTER PLAN

TRANSPORTATION IMPACT STUDY

NEW ENGLAND DEACONESS HOSPITAL

March 1993

Prepared for:

NEW ENGLAND DEACONESS HOSPITAL
185 Pilgrim Road
Boston, MA 02215

Submitted by:

HMM Associates, Inc.
196 Baker Avenue
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HMM Associates, Inc.
A Summit Company

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1.0 OVERVIEW / MASTER PLAN DEVELOPMENT PROJECTS

1.1 Overview

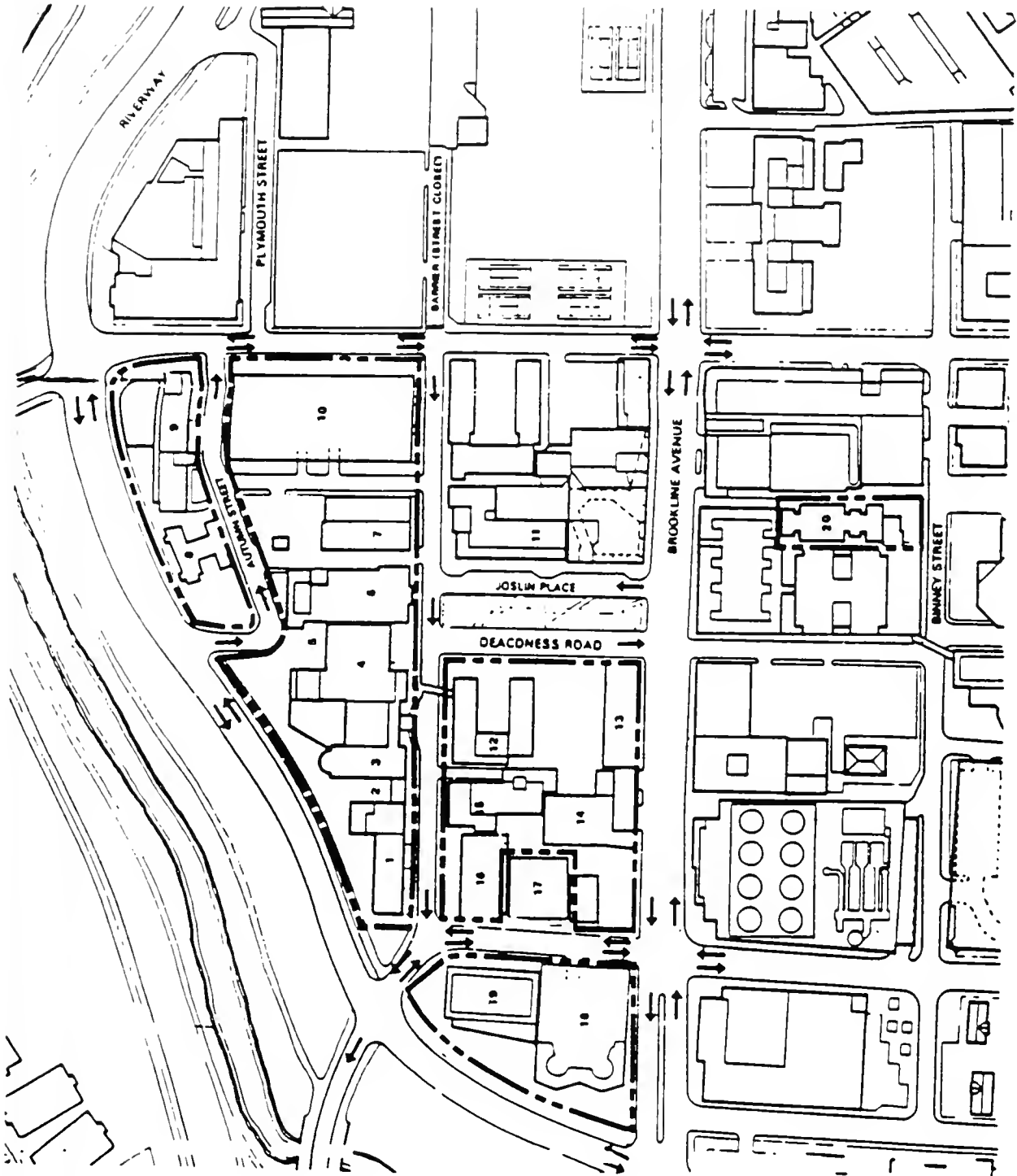
This Transportation Impact Study accompanies the New England Deaconess Hospital's *Facilities Master Plan, 1990 - 2000* (updated October 1992). New England Deaconess Hospital (NEDH) is preparing this Facilities Master Plan update to assist the Hospital in directing the development of its resources into the next decade. The Hospital is located on approximately 376,000 square feet of land (excluding area between streets). The Campus is bordered by the Riverway, Brookline Avenue, and Longwood Avenue (Figure 1-1).

It is not physically or financially feasible for the Hospital to address all of its physical needs simultaneously. The Hospital has established priorities for facilities reorganization and modernization on the basis of the Hospital's planning goals, the immediacy and urgency of the existing identified deficiencies and the anticipated trends in the delivery and financing of health care services.

The Hospital has targeted those portions of its physical plant which are obsolete and incapable of supporting its programs for renovation and redevelopment. It has adopted a Master Plan which combines a reorganization of existing functional space with the upgrading of outdated space. In general, high density diagnostic and patient care uses will remain in the center of campus. Medical research functions will be concentrated in close proximity to the primary patient care facilities. Upgraded commercial/retail uses will be clustered along Brookline Avenue, while existing parking facilities at the edge of the campus will be retained.

The Hospital recognizes the transportation and parking needs not only of its users (i.e., patients, visitors, and employees), but of those in the Longwood Medical Area (LMA) and the City of Boston. It supports the overall objective that projected new development should take place without a significant increase in peak-hour vehicle trips. NEDH also supports area-wide transit, parking, and roadway circulation improvement strategies to meet this overall objective. In this regard, the Master Plan presents the Hospital's overall strategy to reduce single-vehicle occupancy and employee parking demand. The Hospital is committed to providing on-campus parking to patients and visitors. The Master Plan also sets into motion a plan to limit employee parking within the LMA to physicians and other critical employees, including second-shift nurses. Implementation of this will occur over time. Finally, this report is not meant to address the

FIGURE 1-1
LOCUS



Building Key

- 1 PALMER
- 2 CAMPBELL
- 3 BAKER
- 4 BARR
- 5 CAMPBELL
- 6 CAMPBELL
- 7 CAMPBELL
- 8 CAMPBELL
- 9 CAMPBELL
- 10 CAMPBELL
- 11 JOSLIN
- 12 HARRIS
- 13 COMMERCIAL
- 14 STORAGE
- 15 C.H.I.
- 16 C.H.I.
- 17 C.H.I.
- 18 C.H.I.
- 19 LOWRY
- 20 SHIELDS WARREN

NEW ENGLAND DEACONESS HOSPITAL

PAYETTE ASSOCIATES/M. BOSLIN ASSOCIATE

0 50 150ft

impacts of any individual project. A new Transportation Access Plan that will include the entire campus will be prepared in conjunction with future projects.

1.2 Master Plan Development Projects

NEDH has identified several specific development projects to upgrade its facilities. The three primary projects are the renovation (recently completed) of the Kennedy Building located at 1 Autumn Street into an ambulatory care center; the construction of a new clinical facility adjacent to the intersection of Pilgrim Road and Deaconess Road extending to Brookline Avenue; and the construction of a new research facility in the current location of the Maintenance Building on Pilgrim Road. These projects do not represent a major expansion of the Hospital, but are instead designed to address existing deficiencies and to accommodate anticipated needs.

1.2.1 New Ambulatory Care Facility

The elimination of the school of nursing formerly housed in the Kennedy Building and the renovation of the interior of that Building into an ambulatory care center was recently completed. This seven (7) story, 85,000 gross square foot ambulatory care center has addressed one of the Hospital's most pressing needs while generating no significant operating impacts on surrounding areas. All of the renovations were interior and therefore the size and exterior appearance of the Building was unchanged. No significant increase in staff levels has occurred at the Kennedy Building as a result of this change in use. Due to the change of use from School of Nursing to the Ambulance Care Center, vehicle trips generated by the building, while formerly clustered around the peak commuting hours, are now concentrated between the hours of 10:00 AM. and 3:00 PM. The facility will generate an estimated twenty vehicle trips per hour between these times, and sufficient parking has been set aside in the nearby Pilgrim Road Garage.

1.2.2 New Clinical Facility

In May 1992, Deaconess began construction of an approximately 330,000 gross square foot patient care facility to be located at 25 Deaconess Road. The construction of this facility was preceded by the demolition of Harris Hall, an obsolete structure containing support functions. The new clinical facility is to be located across Pilgrim Road from the Hospital's existing primary patient care building and will be connected to that building by

glass-enclosed, elevated passageways above Pilgrim Road at levels 3 through 5. This will enable the two buildings to function as a coherent patient care facility.

Generally, existing hospital diagnostic and treatment functions will be upgraded and relocated into the new clinical facility. The new facility will alleviate existing overcrowded conditions in the Hospital's primary patient care facilities and will provide the necessary space for efficient realignment and operation of the Hospital's existing programs and departments. The new clinical facility is not intended as an expansion of the Hospital's programs and therefore is not expected to generate a significant net increase in Hospital personnel or create the need for a significant amount of increased parking or other support functions.

In conjunction with the construction of the new clinical facility, the Hospital will also modernize its existing clinical space. This space, which is located in the Palmer, Baker, Farr and Deaconess Buildings directly across Pilgrim Road from the proposed location of the new clinical facility, needs substantial renovation and upgrading. The Hospital will undertake a program to correct the deficiencies in this space and to relate the uses in these buildings with the new clinical facility.

1.2.3 New Research Facility

NEDH has identified an urgent need for modern research space in proximity to its clinical program uses. The Hospital intends to address a major portion of this need through the construction of a new facility at the current location of the Maintenance Building and temporary support buildings between Pilgrim Road and Autumn Street. The Maintenance Building, which is in poor condition and badly outdated, will be demolished to make way for the new facility.

The new facility will be ideally located near the Hospital's clinical programs in order to accommodate the Hospital's focus on patient care research. The new facility will enable the Hospital to consolidate many of its research and support programs which are currently dispersed in space on and off-campus, help to relieve overcrowded conditions within existing research space and provide for some research growth. The new facility will include up to approximately 330,000 gross square feet of space devoted to research uses. The actual site-specific traffic will be analyzed as part of a project related Transportation Access Plan (TAP). This TAP will also serve as the amended TAP for the entire campus.

-

1.2.4 Other Projects

In addition to these major projects, NEDH is also undertaking other measures to upgrade its facilities and support its programs and personnel. A day-care center accommodating up to 58 children has recently been completed within the Maintenance Building. This day care space will be relocated elsewhere on campus when the Maintenance Building is demolished to make way for the new research facility. The Hospital also recently added three floors containing approximately 4,100 square feet each between its existing Baker and Palmer Buildings. This space along with additional space leased off-campus will help to alleviate the Hospital's need for support space which has been created by the recent demolition of Harris Hall.

1.3 Summary and Findings

The New England Deaconess Hospital has proposed the modernization of its current campus. The hospital will provide traffic and parking management programs which will, in turn, implement mitigation plans and incentives to reduce traffic congestion in the future. No additional on-site parking will be constructed. The hospital's mitigation plans will include discussion of how NEDH fits into the existing and future transportation system in the Longwood Medical Area (LMA). Improvements to the surrounding transportation system deemed desirable for the development of NEDH will also be presented.

In response to area-wide traffic congestion and parking needs in the LMA, NEDH, in close coordination with the Medical Area Service Corporation (MASCO), has prepared a comprehensive program to reduce the amount of traffic by promoting transportation alternatives. The Demand Management measures, explained in detail in CommuteWorks' NEDH Commuter Mobility Work Plan,¹ are listed below:

- NEDH continues to implement an educational program that promotes the benefits of using commuting alternatives.
- NEDH has increased its transit subsidy to 40 percent, the highest among LMA hospitals. This initiative has increased transit use by an average of 13 percent per year over the last three years. This subsidy is expected to increase to 50 percent by 1995, further reducing vehicle trips to the NEDH campus.

1. *NEDH Commuter Mobility Work Plan*, CommuteWorks (MASCO), November 1991.

- NEDH promotes ridesharing including the offering of incentives to employees. CommuteWorks, in coordination with MASCO, provides employee-matching information so ridesharing can be formulated with the entire population of LMA employees. Van services are provided to reduce single-drivers, vacating more parking spaces for patients and visitors. Reserved parking spaces are provided by MASCO for vans and carpools to offer convenience in ridesharing. An Emergency-Ride-Home program is being considered by NEDH which will allow employees to use the transportation service in the event of an emergency.
- Adequate bike racks and cages along with showers are provided to promote cycling.
- NEDH continues to encourage off-site parking and use of the MASCO and NEDH shuttle services.
- An informal program allowing flexible work hours is in place and is managed on a department-by-department basis.
- NEDH has participated in an improved lighting and security program in the LMA, which will encourage people to walk to work. NEDH has implemented a program informing people on routes and safety.
- NEDH utilizes parking disincentives, such as raising parking prices, to encourage employees to utilize alternative modes of transportation. The hospital will increase parking rates by an average of 9% in January, 1993 and will increase employee parking rates by another 5.5% in January 1994.
- NEDH will introduce a parking coupon system in 1993, which will allow employees who require vehicles on certain days only to buy tickets for the days they must drive. On other days, employees can utilize the transit services.
- NEDH discourages new employees from driving alone to work, since these employees are not be provided with on-site parking spaces. As employees retire or are terminated, the vacated on-site spaces are reserved for patient and visitor parking which has a higher parking turnover rate. It should be noted, however, that NEDH currently has a low employee attrition rate.

2.0 EXISTING CONDITIONS

2.1 Traffic Study Area

The New England Deaconess Hospital (NEDH) is located in the western portion of the Longwood Medical Area (LMA). The existing roadways within the study area consist of three major arterial streets (Brookline Avenue, Longwood Avenue and the Riverway) and four local streets (Pilgrim Road, Francis Street, Deaconess Road and Joslin Place). The roadways in the area serve a mix of commercial, institutional, and residential land uses.

2.2 Major Roadway Characteristics

Brookline Avenue is a major (northeast-southwest) arterial which carries heavy commuter traffic during the morning and evening peak periods. Brookline Avenue also carries a substantial amount of patients, visitors and service-related traffic throughout a typical weekday. Brookline Avenue is approximately 60-feet wide consisting of two (2) northbound, two (2) southbound and a center two-way left turn lane. In the Fall of 1990, the parking meters on Brookline Avenue were removed from both Beth Israel Hospital to Deaconess Road, and the pavement markings were modified by the Boston Transportation Department (BTD) to create an additional travel lane. The Riverway is a major 4-lane, 52-foot-wide parkway which passes west of the site. The Riverway is under MDC jurisdiction, and truck traffic is prohibited. Longwood Avenue is a major (east-west) arterial which carries LMA commuters west to the Town of Brookline, and east to Huntington Avenue. Longwood Avenue is 32 to 34 feet wide consisting of one westbound, and one eastbound lane. (Parking meters have been removed on Longwood Avenue in the section between the Riverway and Brookline Avenue.) At Longwood Avenue and the Riverway, Longwood Avenue has exclusive right-turn lanes both eastbound and an exclusive left-turn lane westbound. At Longwood Avenue and Brookline Avenue, Longwood Avenue has an exclusive left turn lane eastbound and westbound. Longwood Avenue widens to 42 feet (from Brookline Avenue to Binney Street), but then narrows to 34 feet at Blackfan Street. Joslin Place is a one-lane, one-way westbound 31-foot wide local street with metered parking along both curbsides. Deaconess Road is a one-lane, one-way eastbound 35-foot wide local street with metered parking along the Joslin Park side only. Situated between these two roads is Joslin Park which is utilized by Joslin and Deaconess employees as well as visitors

throughout the day. Pilgrim Road is a one-lane, one-way southbound 24-foot wide street, from Longwood Avenue to Francis Street. Parking is prohibited on most of Pilgrim Road. Francis Street is a 42-foot wide, two-lane, two-way street from the Riverway to Brookline Avenue with prohibited parking.

2.3 Existing Traffic Volumes

The Existing (1991) AM and PM peak hour traffic volumes are presented on Figures 2-1 and 2-2. Traffic volume data for the morning (7:30 to 8:30 AM) and evening (5:00 to 6:00 PM) peak hours were obtained from the Boston Transportation Department (BTD)¹. Turning movement counts (TMCs) were performed by BTD in March, 1991 for the intersection of Longwood Avenue at Riverway, and in September, 1990 for the intersection of Longwood Avenue at Brookline Avenue. These counts were adjusted to 1991 average weekday volumes. The new MASCO garage vehicle trips were added to the existing traffic volumes, because the counts were performed before the garage was occupied². The vehicle trips added from the MASCO garage are an overestimation of volumes existing in 1991 since the garage was not fully occupied in that year. The traffic volumes along Longwood Avenue include the addition of the MASCO garage vehicle trips.

Automatic traffic recorder counts were obtained from MASCO for eight roadways in the surrounding study area. Comparisons of average daily traffic from 1986/1987 to 1990/1991 reveal some dramatic increases and decreases on Brookline Avenue, Longwood Avenue and the Riverway. Table 2-1 shows the traffic volume changes.

The substantial change of the traffic volumes on the roadways are a result of many factors ranging from redesign of roads and intersections altering travel patterns to the current economic situation reducing traffic in the area.

In order to show the impact during the AM and PM peak hours, the percentage of average daily traffic occurring during the peak hour was calculated at the three major roadways. This comparison can be seen in Table 2-2.

1. Boston Transportation Department, Longwood Avenue at Brookline Avenue counts on September 24 and 25, 1990; Longwood Avenue at Riverway, on March 27, 1991.

2. MASCO, *375 Transportation Access Plan and Impact Study*, May 1990.

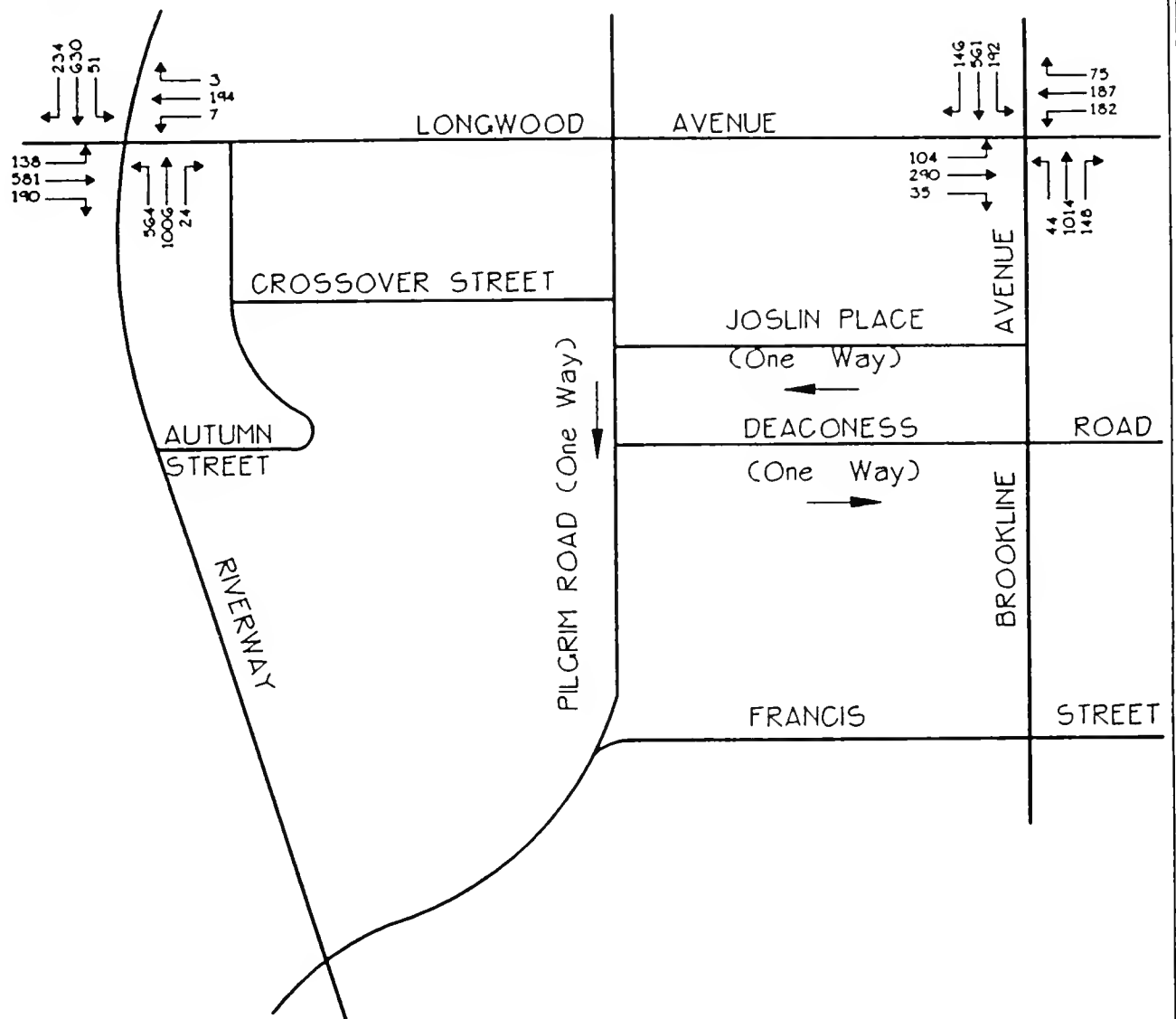


FIGURE 2-1
AM EXISTING VOLUMES

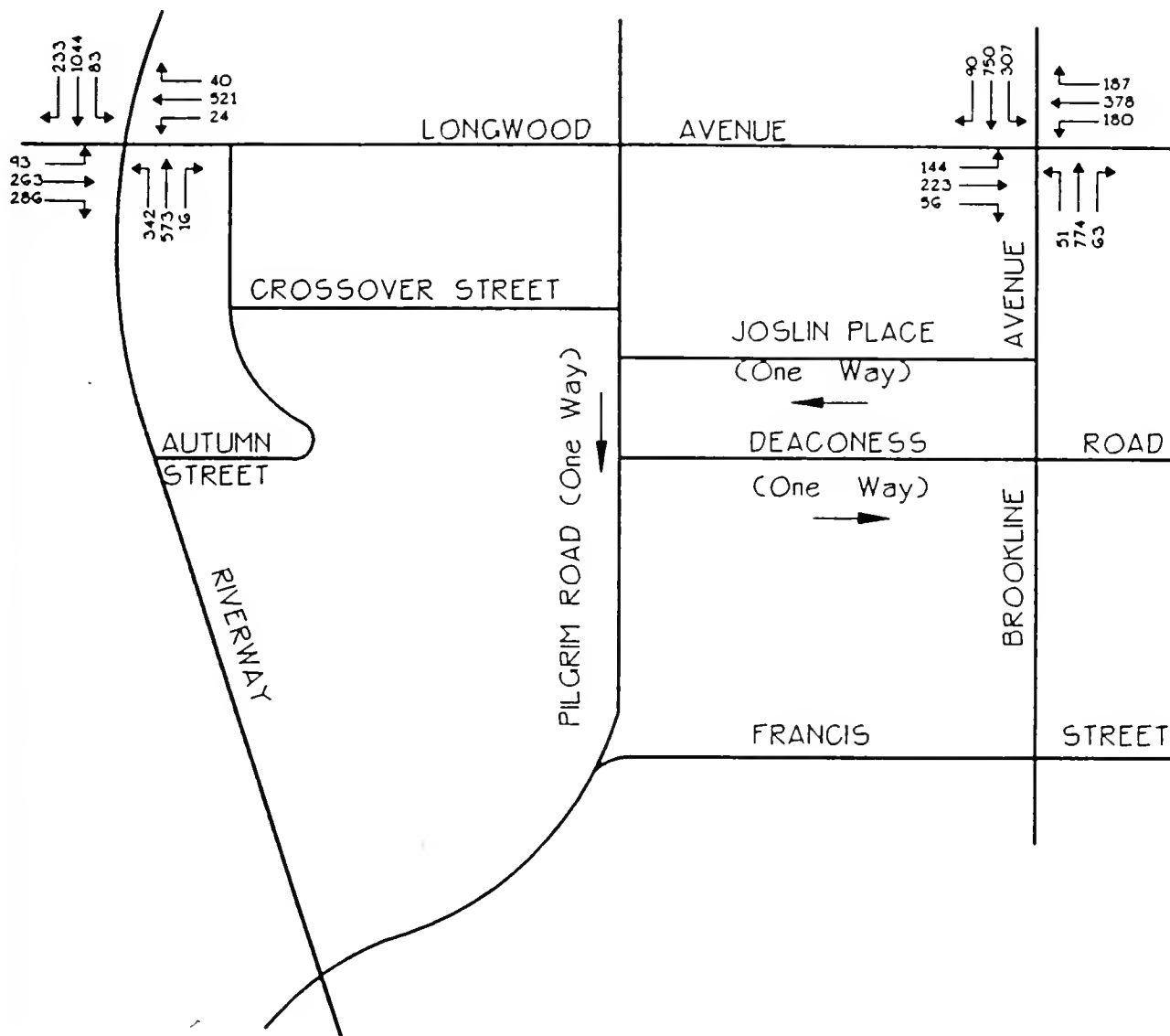


FIGURE 2-2
PM EXISTING VOLUMES

Table 2-1: Comparison of Average Weekday Daily Traffic Counts¹

	<u>1986/1987</u>	<u>1990/1991</u>	<u>Percent Change</u>
1. Longwood Avenue (East of Brookline Avenue)	12,516	13,484	+8%
2. The Riverway (North of Longwood Avenue)	25,526	21,891	-14%
3. Brookline Avenue (South of Longwood Avenue)	28,276	22,025	-22%

¹ MASCO counts performed from November, 1986 to April 1987; April 1990 to May 1990, and March 1991 to April 1991.

Table 2-2: 1991 Peak Hour Traffic Comparisons

	<u>ADT</u>	<u>Morning Peak Hour</u>	<u>Percent of ADT</u>	<u>Evening Peak Hour</u>	<u>Percent of ADT</u>
1. Longwood Avenue (East of Brookline Avenue)	13,484	1,074	8.6%	1,338	10.7%
2. The Riverway (North of Longwood Avenue)	21,891	2,062	8.1%	2,066	8.1%
3. Brookline Avenue (South of Longwood Avenue)	22,075	1,984	7.1%	1,874	6.6%

The percentage of peak hour traffic volumes to the total daily traffic volumes at the three roadways average approximately 8% during the AM peak and approximately 8.5% during the PM peak hours. Non-peak hour volumes are highest as a percentage of ADT, on Brookline Avenue, and are a higher percentage of ADT on The Riverway than on Longwood Avenue.

The Automatic Traffic Recorder (ATR) counts taken on Brookline Avenue (south of Longwood Avenue) were performed during a full week period and resulted in an average of 22,025 vehicles per day. The hourly distribution of these vehicles can be seen in Figure 2-3. As shown in Figure 2-3, traffic on Brookline Avenue peaks in the morning from 8:00 to 9:00 AM and in the evening from 5:00 to 6:00 PM. The relative constancy of the traffic volume from 7:00 AM to 7:00 PM is also evident.

2.4 Existing Traffic Operations

Traffic operations were analyzed according to standard procedures and practices outlined in the 1985 *Highway Capacity Manual*. The efficiency of traffic operations at a location is measured in terms of Level of Service (LOS). The LOS refers to the quality of traffic flow along roadways and at intersections. It is described in terms of Levels A through F, where A represents the best possible free-flow traffic conditions, and F represents congested, forced-flow or failing conditions.

At signalized intersections, LOS is defined in terms of average approach delays. For unsignalized intersections, reserve capacities are used to determine LOS. These measures are discussed briefly below, and Table 2-3 summarizes their interrelationships. Average delay measures the mean stopped delay experienced by vehicles prior to entering a signalized intersection during the peak-hour period. Average delay is measured for each individual approach and for the intersection as a whole. Increasing average delays define deteriorating LOS.

Table 2-4 shows the 1991 Existing AM and PM levels of service at the two study area intersections which the BRA and Boston Transportation Department scoped for analysis in conjunction with the new research facility project. The intersection of Longwood Avenue at Riverway operates at LOS F during the AM peak hour and LOS F during the PM peak hour. The intersection of Longwood Avenue at Brookline Avenue operates at LOS D during the AM peak hour and LOS F during the PM peak hour. All Level-of-Service calculations are shown in Appendix A.

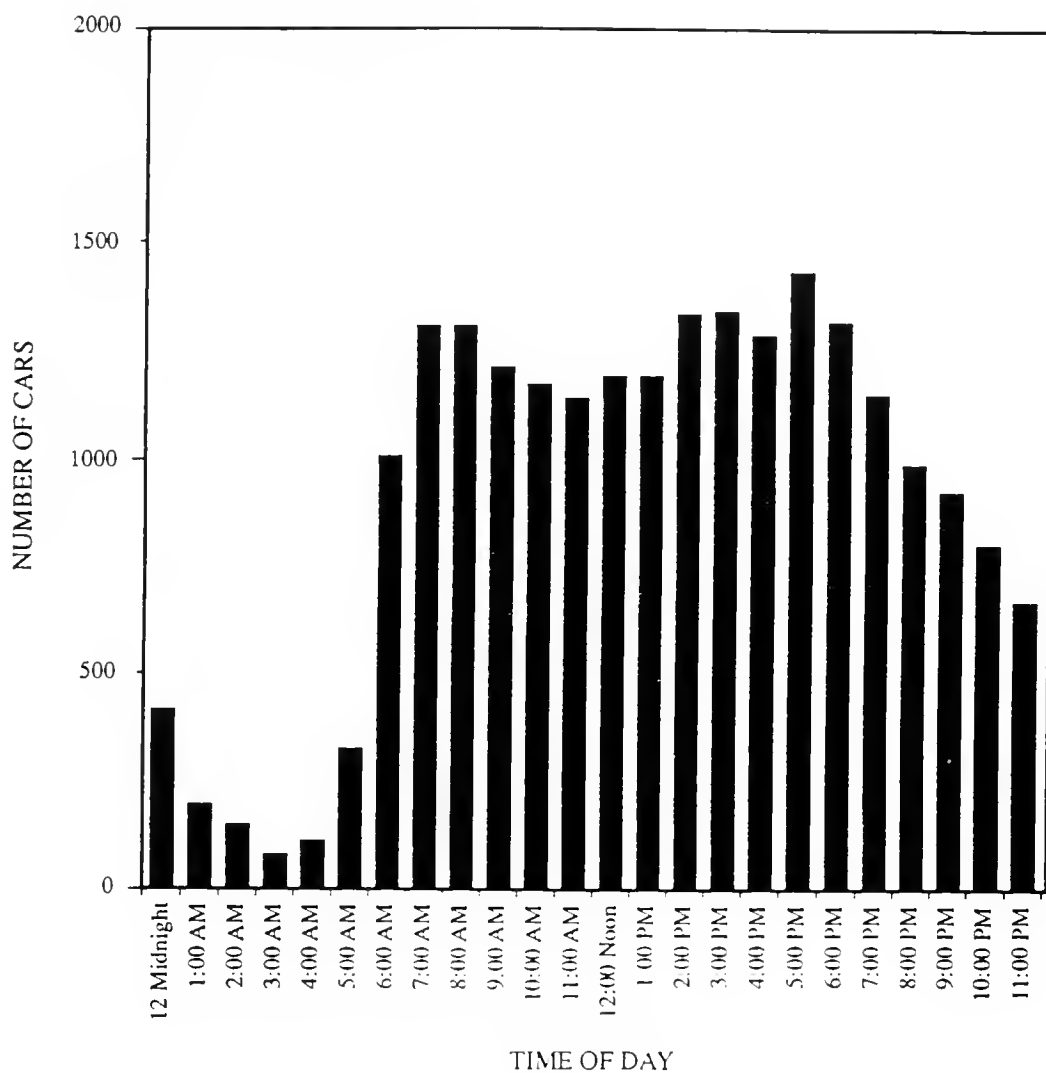


FIGURE 2-3
BROOKLINE AVENUE
HOURLY VEHICLE DISTRIBUTION

Table 2-3: Level of Service (LOS) Designations*

<u>Category</u>	<u>Description</u>	<u>Delay Range** (Seconds/ Vehicle)</u>	<u>Reserve*** Capacity (Vehicles /Hour)</u>
LOS A:	Describes a condition of free flow, with low volumes and relatively high speeds. There is little or no reduction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds with little or no delay.	0.00-5.0	400+
LOS B:	Describes a condition of stable flow, with desired operating speeds relatively unaffected, but with a slight deterioration of maneuverability within the traffic stream.	5.1-15.0	300-399
LOS C:	Describes a condition still representing stable flow, but speeds and maneuverability begin to be restricted. The general level of comfort begins to deteriorate noticeably at this level.	15.1-25.0	200-299
LOS D:	Describes a high-density traffic condition approaching unstable flow. Speeds and maneuverability become more seriously restricted, and the driver experiences a poor level of comfort.	25.1-40.0	100-199
LOS E:	Represents conditions at or near the capacity of the facility. Flow is usually unstable, and freedom to maneuver within the traffic stream becomes extremely difficult.	40.1-60.0	0-99
LOS F:	Describes forced flow or breakdown conditions with queuing along critical approaches. Operating conditions are highly unstable as characterized by erratic vehicle movements along each approach.	60.1 or greater	N/A

* Source: Transportation Research Board, *Highway Capacity Manual*, Special Report 209, 1985.

** Delay ranges relate to the mean stopped delay incurred by all vehicles entering the intersection and do not consider the effects of traffic signal coordination. This criteria is intended for use in the evaluation of signalized intersections.

*** Reserve capacity refers to the unused capacity of the minor approach, on a per-lane basis. This criteria is limited to use in the evaluation of unsignalized intersections.

Table 2-4: 1991 Existing Levels of Service

<u>Signalized Intersection</u>	<u>Peak Hour</u>	<u>1991 Existing¹</u>	
		<u>LOS</u>	<u>Delay</u>
1. Longwood Avenue at The Riverway	AM	F	300+
	PM	F	300+
2. Longwood Avenue at Brookline Avenue	AM	D	36.13
	PM	F	71.58

1 1991 Existing Volumes include the addition of the fully occupied MASCO Garage at 375 Longwood Avenue.

2.5 Existing 1991 NEDH Trip Characteristics

2.5.1 Employee Trip Characteristics

The current staff level at New England Deaconess Hospital is 3,250 employees. Based upon the NEDH Commuter Mobility Work Plan,¹ the majority of employees work a predominant 8:00/8:30 AM to 5:00/5:30 PM shift. Day-shift employees begin arriving at 6:30 AM and depart through 7:00 PM, comprising approximately 70% of the total staff. This results in 2,275 employees during the day-shift. See Table 2-5 for the existing Trip Generation Projections.

According to the Commuter Mobility Work Plan, approximately 66% of NEDH employees drive alone to work, while the remaining use alternative transportation such as carpools (4%), MBTA surface transit and bus service (27%), and walking (3%). (This data will be updated by NEDH upon submission of the Transportation Access Plan that will be required as part of the future Research Building submission.) The Longwood Medical Area (LMA) is served by two branches of the MBTA Green Line and four regular MBTA bus routes. Each of these routes provides service to communities outside the LMA. The NEDH has recently increased efforts to encourage employee use of public transportation by selling and subsidizing MBTA T-Passes. The percentage of employees purchasing MBTA passes has been increasing steadily over the last three years. This is due to NEDH's high (40%) subsidy toward the cost of a pass. The 40 percent subsidy by NEDH, compared to 25 percent by most LMA hospitals, is the highest percent among all LMA hospitals. This increased subsidy has resulted in transit ridership share at 27 percent. With the addition of 3 percent of employees who walk, the number of employee vehicle trips decreased to 70 percent in 1991. In actual numbers, 1,592 day shift employees (2,275 x 70%) use private vehicles to get to work.

An auto-occupancy survey was taken at the Deaconess-Pilgrim Road garage by HMM Associates in 1990. Results from this survey indicated a rate of 1.067 for NEDH employees. This auto-occupancy rate results in 1,492 (1,592/1.067) employee vehicle-driver trips.

The NEDH CommuteWorks Plan indicates that 50 percent of all employees arrive in the morning hour peak between 8:00 AM to 9:00 AM. During the evening, 47 percent depart during the 4:30 PM to 5:30 PM peak hour.

1. *NEDH Commuter Mobility Work Plan*, CommuteWorks (MASCO) November 1991.

HMM used a conservative 55 percent arrivals to represent both peak hours. The 55 percent arrivals result in 821 ($1,492 \times 55\%$) employee vehicle trips. Using a 95/5 peak hour directional split it is assumed that 41 (5%) vehicles will depart during the AM and arrive during the PM.

Based upon the increased subsidy for T-Passes, the transit/walk transportation mode is 30 percent which amounts to 682 employees arriving and 34 departing during the AM peak hour, and 34 arriving with 682 departing during the PM peak hour. See Table 2-5.

2.5.2 Visitor and Outpatient Trip Characteristics

The estimated 1992 outpatient and visitor arrivals at NEDH was 1,028 persons per weekday¹. HMM used a 95% auto mode split to reflect a conservative estimate and does not fully account for outpatients who arrive via taxi or paratransit services. Actual data, to be collected as part of an updated TAP will determine the actual percentage of visitors and outpatients that travel by alternative sources. An automobile occupancy rate for visitors of 1.2, based upon data collected at the Deaconess-Pilgrim Road Garage has been assumed for both facilities. This was determined by observing the number of passengers arriving in each car. This is not surprising since many outpatients are not able to drive alone and must be accompanied by another person. (The updated TAP will review the patient and visitor occupancy rate.) Use of 1.2 as the auto occupancy rate results in a total of 814 daily one-way vehicle trips - 510 to 110 Francis Street and 304 to Pilgrim Road. Visitors and patients begin arriving at the two Deaconess Garages at 7:00 AM at fairly low volumes, and visits remain constant throughout midday. For a typical day, approximately 15% of the daily visitors arrive/depart during the morning/evening peak hour. The resulting peak hour visitor trips by automobile are 122 arrivals and 122 departures during the AM peak hour with 12 arrivals and 122 departures during the PM peak hour.

The remaining 5 percent of visitors that use the transit/walk mode result in 51 trips arriving and 5 trips departing during the AM peak hour with 5 trips arriving and 51 trips departing during the PM peak hour.

¹ Sources: 1991 parking survey at Pilgrim Road Garage; July 1992 receipts for 110 Francis Street Garage.

A	B	C	D	E	EMPLOYEE TRIPS BY AUTOMOBILE								EMPLOYEE TRIPS BY TRANSIT/WALK								K	L	M	VISITOR TRIPS BY AUTOMOBILE								P	VISITOR TRIPS BY TRANSIT/WALK																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
					FULL TIME YEAR	EMPLOYEES	SHIFT	% SHIFT EMPLOYEES	DAY SHIFT	AUTO MODE SPLIT	OCCUPANCY UTILIZATION	% ARRIVALS IN PEAK HOUR	PEAK HOUR VEHICLES				TRANSIT MODE SPLIT	AM	PM	IN				OUT	TRANSIT MODE SPLIT	AM	PM	IN	OUT	TRANSIT MODE SPLIT	AM		PM	IN	OUT	TRANSIT MODE SPLIT	AM	PM	IN	OUT																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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NOTES:

1. Employee Peak Hour Vehicle Trips = $\frac{B \times C \times E \times G}{F}$

2. Visitor Peak Hour Vehicle Trips = $\frac{K \times L \times O}{M}$

TABLE 2-5
1991 EMPLOYEE AND VISITOR TRIP PROJECTIONS

2.6 Existing Parking Facilities

NEDH maintains a total supply of 1,558 parking spaces, both on and off-campus. As shown in Table 2-6, there are 1,071 off-street parking spaces in the NEDH garages (Pilgrim Road and 110 Francis Street) located on the NEDH campus. Within the LMA itself, NEDH leases 111 spaces at the MASCO Garage located at 375 Longwood Avenue. Currently, NEDH allocates on-campus and LMA parking spaces in this order: patients and visitors; physicians and residents as well as second shift nurses; employees hired prior to December 1984 who were on the parking waiting list prior to August 1988 and key management personnel. The grandfathered spaces are returned to patient/visitor use as employees retire. Currently, some 10 spaces/year are vacated and returned. This policy has been strictly adhered to since its inception and is continually monitored. As a result, the Hospital has not allowed new employees to park in the two on-campus garages since August 1988.

The remaining employees park at nearby spaces located off-campus. The majority of these are within walking distance, while others, such as those within the Fenway, in Brookline or at Boston University, require a short shuttle ride to/from the NEDH. The location of the parking facilities are shown on Figure 2-4.

The current staff at Deaconess Hospital includes 3,250 employees, 2,275 of whom work during the day-shift. Table 2-7 shows the theoretical peak parking demand at 1,492 employee spaces.

NEDH provides only 1,101 spaces for employees, a 391-space shortfall. However, it should be noted that this is a theoretical shortfall since many of the physicians utilizing on campus spaces do not all arrive and depart on a daily basis, thus enabling the hospital to employ a valet service. The remaining demand is not met by the Hospital existing employees with the options of paying commercial rates at other facilities or using transit. As noted in Section 3.0, the hospital has a very active program in place to reduce single occupancy vehicle demand, including restricting on-campus employee parking, increasing the cost for on-campus parking, and incentives for purchasing transit passes. All parking assumptions will be reviewed as part of the soon to be completed Transportation Access Plan update.

Table 2-6: Existing Parking Supply and Assignment

<u>No.</u> ¹	<u>Facility</u>	<u>Location</u>	<u>Total</u> ¹ <u>Spaces</u> ¹
1	Deaconess-Pilgrim Road Garage	On Campus	761
2	NEDH Garage (110 Francis Street)	On Campus	310
3	MASCO Garage (375 Longwood Avenue)	Within LMA	111 ²
4	Petersborough Lot	Nearby	120
5	Yawkey Way Lot (55 Yawkey Way)	Nearby	65
6	Wentworth Lot (61 Prentiss Street)	Nearby	10
7	Staples Lot (1255 Boylston Street)	Nearby	35
8	Kenmore Lot (73 Brookline Avenue)	Nearby	30
9	900 Commonwealth Avenue Lot	Nearby	44
10	Brookline Place (One Brookline Place)	Nearby	20
11	Boston University (286 Babcock St.)	Nearby	<u>41</u>
TOTAL			1,542

1. See Figure 2-4 for location.

2. Total capacity of MASCO Garage is 750. NEDH leases 111 spaces.

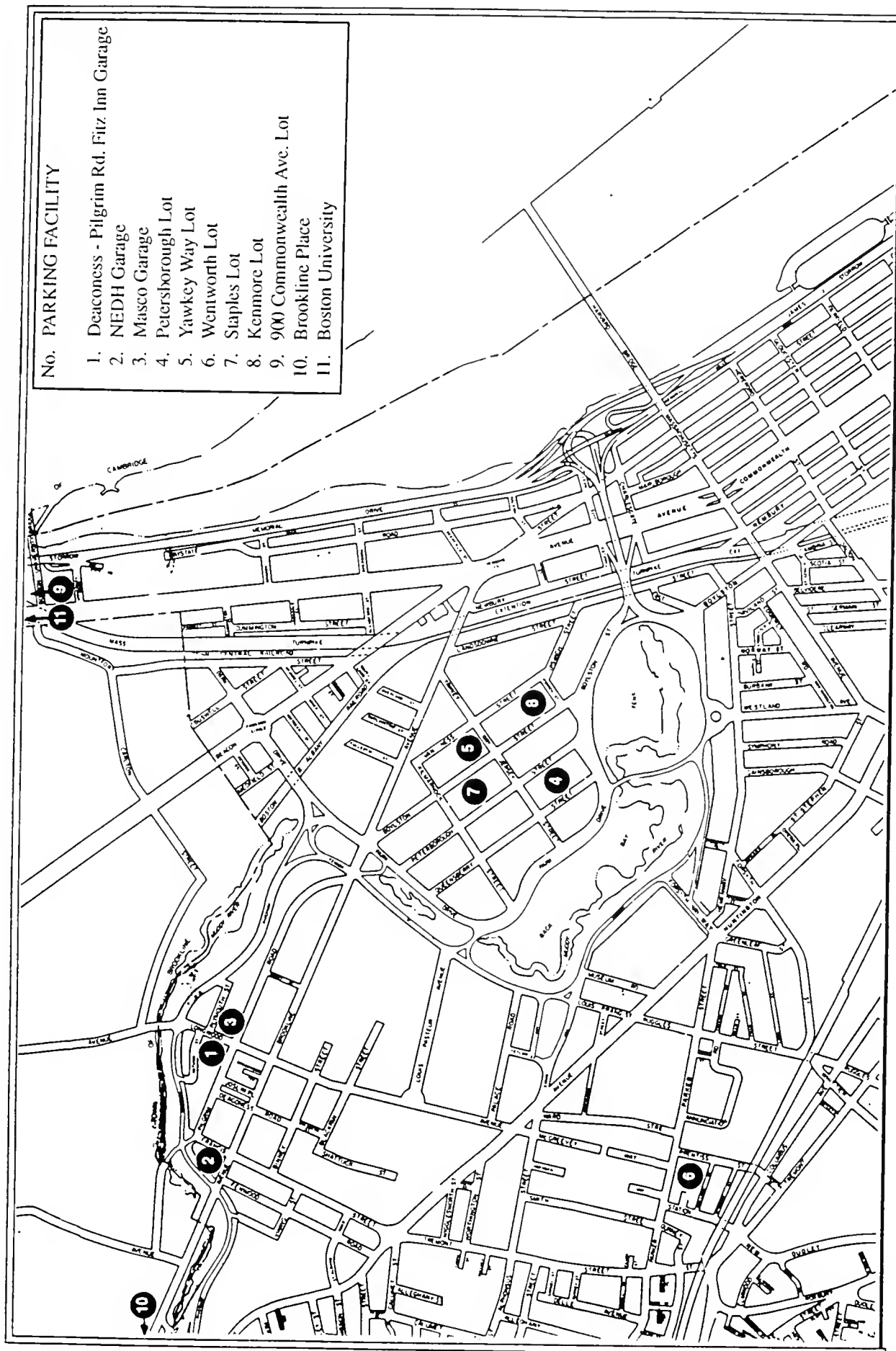


FIGURE 2-4
EXISTING PARKING FACILITIES

A	B	C	D	E	EMPLOYEES			H	I	J	K	VISITORS			N	O
					FULL TIME EMPLOYEES	% DAY SHIFT	AUTO MODE SPLIT					AUTO OCCUPANCY	DAILY AUTO'S (ONE WAY)	TURNOVER RATE (UTILIZATION)		
1991	3250	70%	70%	1 067	1492	1.0	1492	1028	95%	1.2	814	3.5	233	1725		

NOTES

1. $\text{Employee Peak Hour Parking Demand} = \frac{B \times C \times D}{E}$

2. $\text{Visitor Peak Hour Parking Demand} = \frac{I \times J}{K \times M}$

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9/9/92

NOTES

1. $\text{Employee Peak Hour Parking Demand} = \frac{B \times C \times D}{E}$
2. $\text{Visitor Peak Hour Parking Demand} = \frac{I \times J}{K \times M}$

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TABLE 2-7
EXISTING PEAK PARKING GENERATION



Table 2-8: 1991 Parking Assignments

Facility	Location	Total Spaces	Sublet Spaces ¹	NEDH Physicians ²	NEDH Nurses ³	NEDH Others	Visitors/ Visitors		
					Day Shifts	Night Shifts	Eve/ Rotating Shifts		
1. Pilgrim Road Garage	On-Campus	761	170	175	142	249	112	269	74
2. 110 Francis Street	On-Campus	310	0	175	0	0	0	13	155
3. MASCO	Within LMA	111	0	8	5	0	0	103	0
4. Peterborough Street	Nearby	120	33	0	18	0	38	87	0
5. 55 Yawkey Way	Nearby	100	0	18	10	0	53	31	0
6. 61 Prentiss Street	Nearby	10	0	0	0	0	0	11	0
7. 1255 Boylston Street	Nearby	30	0	0	20	0	0	6	0
8. 73 Brookline Avenue	Nearby	30	25	5	0	0	0	7	0
9. 900 Commonwealth Avenue	Nearby	35	0	0	0	0	0	33	0
10. One Brookline Place (Brookline)	Nearby	20	0	5	10	0	0	11	0
11. 286 Babcock Street	Nearby	32	0	0	0	0	0	28	0
		1558	228	386	170	249	203	602	229

1. Spaces sublet by Joslin Clinic and Anesthesia Associates.
2. Not all physicians are on campus at the same time due to office and hospital schedules. If necessary, physician cars are valet parked.
3. 60% of Rotating Shift nurses are working during the day.

3.0 FUTURE TRANSPORTATION IMPACTS

3.1 Future Parking Demand

According to New England Deaconess Hospital's planners, NEDH is projected to employ 3,730 people in 1997. Using the same employee trip modes as the 1991 projections, the demand for employee (long-term) parking spaces will increase by 147, and visitor short-term parking spaces by 11 without continued implementation of NEDH's ongoing demand management program. This on-going program includes a Commuter Mobility Work Plan¹, demand management incentives, traffic operation improvements, and parking management improvements. The following sections describe these incentives.

3.1.1 Parking Policy

It is the stated policy of the New England Deaconess Hospital to achieve the following long term parking goals:

- patients and visitors are to be provided spaces on the hospital campus;
- physicians and second shift nurses will park within the LMA; and
- general employee parking will be located outside of the LMA.

Currently, the only LMA garage utilized by NEDH is the MASCO Garage at 375 Longwood Avenue. Because of its proximity, many of the grandfathered employees are parked here.

To reduce employee parking within the LMA, NEDH will increase the cost of parking by an average of 9% in January 1993. As shown in Table 3-1, the new weekly rates will range from \$6.00 for a night-shift nurse to \$20.00/week for day-shift employees. The increase in the off-campus parking rate ranged from 8.1% for rotating shift employees to 8.3% for day shift employees. In 1993, the rates for on-campus parking will increase again by an average 5.5%. In addition, NEDH recently increased MBTA T-pass subsidies from 35% to 40%.

1. *NEDH Commuter Mobility Work Plan*, CommuteWorks (MASCO), November 1991.

Table 3-1: Parking Rate Structure

	<u>Old Rate</u>	<u>New Rate</u>	<u>Percentage Increase</u>	<u>Proposed Future Rate</u>
Onsite				
Day Shift	\$18.25	\$20.00	9.6%	\$21.00
Rotating Shift	13.75	15.00	9.1%	15.75
Evening Shift	11.50	12.50	8.7%	13.25
Night Shift	5.50	6.00	9.1%	6.25
Offsite				
Day Shift	\$12.00	\$13.00	8.3%	\$13.75
Rotating Shift	9.30	10.05	8.1%	10.55

It should be noted, however, that off-campus parking is currently leased on a monthly basis due to current market conditions. Currently MASCO, as well as its individual member institutions, are searching to identify a location, or locations, that can be developed for permanent centralized parking.

To maximize vanpool ridership, thereby leading to reductions in use of single-passenger vehicles, NEDH has implemented a vanpool and riding program, in cooperation with Commute Works. Vanpool parking is provided at MASCO's nearby garage located at 375 Longwood Avenue.

The NEDH policy on visitor/patient parking is designed to provide convenient, safe, low-cost parking at the two on-campus garages. A 50% discount on the maximum garage charge (\$14.00 per day) is available to all patients and their families. This discount becomes effective after a stay of 5 hours. Patients and visitors may obtain this discount at the Valet Booth in the Farr Lobby from 7:00 AM to 9:00 PM weekdays and in the Admitting Office on nights, holidays, and weekends. Families requiring additional discounts may make requests through the Social Services or the Commuter Services Departments.

A special maximum parking charge of \$2.00 per visit is given to outpatients who require several repeat visits to complete their course of treatment, as well as patients who have appointments in Pre-Admission Testing, Outpatient Day Care, Same Day Surgery, Ambulatory Surgery, and Guest Quarters.

Free on-campus parking is provided to Blood Donors, Visiting Chaplains, and Volunteers. Individual hospital departments purchase parking coupons from the Commuter Services Office at \$6.00 per coupon to use at their discretion. These coupons are distributed to visiting firemen, guest lecturers, trustees, etc. which gives them courtesy parking privileges.

3.2 Demand Management Incentives

3.2.1 Educate Employees

The hospital educates each employee so that all prospective and current employees understand each of the commuter options and its benefits and costs. This process helps inform employee attitudes about driving alone versus other commuting modes.

- The Commuter Services Department has expanded operations to provide literature to drivers on mass transit fares, schedules, and routes; ridesource and CommuteWorks information; T-pass employee subsidy incentives; off-campus parking lot locations and incentive fees; and lists of carpools and vanpools looking for riders.
- The hospital publicizes to new employees (and periodically to all employees) information on T-pass employee subsidy incentives, MBTA routes and fares, off-campus parking lot locations and fees, lists of carpools and vanpools looking for riders. This information can be published in the NEDH monthly newsletter.
- The hospital has taken an active role in MASCO's CommuteWorks program.

3.2.2 Promote Mass Transit

NEDH currently allows employees to purchase MBTA monthly T-passes on a cash or payroll-deduction basis. The hospital recently increased its subsidy of T-passes by 5 percent up to 40 percent (previously 35 percent). This is the highest subsidy in the LMA. By increasing the subsidy 5 percent, the hospital has been able to increase T-pass sales 25 percent. Since this is a recent change, it is expected that the sales will further increase once more people become aware of it. The hospital plans to increase subsidies gradually to 50 percent by 1997. It is estimated that by 1997 the transportation mode split will be 60 percent vehicle trips and 35

percent transit trips. The hospital currently provides a convenient on-campus location for purchasing MBTA passes and actively encourages their use by in-house mailings and correspondence.

NEDH is an active participant in the Greater Boston Medical Commuter Services Council. This Council is negotiating with the MBTA for development of full transportation centers (FSTC's) with the LMA. Through the FSTC, patients, visitors and employees would be able to purchase all MBTA tokens and commuter passes on-site.

3.2.3 Promote Ridesharing

The CommuteWorks agency utilizes the Ride Source computer program that enables employees to contact other LMA employees interested in sharing a ride to/from work. CommuteWorks provides registration cards, monthly computer matching services, and follow-up services to ensure easy transition from driving alone to carpool/vanpool mode. NEDH works closely with CommuteWorks to increase ridesharing by employees. By utilizing 8-passenger vans, the overall vehicle occupancy rate can be increased to approximately 1.1 passengers/vehicle.

Most employees are apprehensive about ridesharing because of a fear of not being able to get home in the event of an emergency. Therefore, in conjunction with carpool/vanpool services, an Emergency-Ride-Home program is being reviewed so that employees belonging to a carpool/vanpool who are confronted with an emergency during the day can get a ride home. This program requires supervisor approval before an employee can obtain the emergency ride. The vehicle used can be either the NEDH commuter van (schedule permitting) or a local taxi company.

3.2.4 Alternative Work Hours

The hospital allows employees, on an informal basis, to participate in flexible work hours to the maximum degree permitted by the nature of their work and the requirements for control. This option allows employees to select from numerous transit schedule times without being pressured to arrive at a specific time. Flexible work hours encourage employees to form carpools according to their schedules. By adjusting the arrival and departure times of employees, the area-wide vehicle congestion can be substantially reduced during the peak hours.

3.2.5 Encourage Walking/Cycling

Improved lighting and security in the LMA will encourage people to walk to work. A program to educate people on safe and convenient walking routes has been implemented, along with increased protection wherever and whenever feasible. In addition, the Hospital provides bike racks/cages at its garages. The goal is to have 5% of the work force walking and/or bicycling to work in 1997.

3.2.6 Parking Disincentives

The hospital recently increased its subsidy for T-passes to 40 percent and plans to increase it further up to 50 percent. The hospital discourages employees from driving alone by developing disincentives, such as raising parking rates. As an example, the hospital approved a 9% increase in employee parking rates in January 1993, with another 5.5% increase in January 1994.

3.2.7 Implement a Parking Coupon System

Currently, employees use a card-entry system at the Deaconess-Pilgrim Road garage that provides them with unlimited use on a monthly basis. Some employees who are attending a local university twice a week need their car only on those nights and can ride the T on the remaining weeknights. To discourage an employee from purchasing a monthly card, the hospital utilizes a coupon system whereby an employee can purchase 8 to 10 coupons per month and use other commuter modes on the remaining days of the month. This system provides an easy transition from drive-alone to bus-T-commuter rail modes.

3.3 Summary and Conclusion

NEDH will continue to implement its transportation demand management program designed to reduce single occupancy vehicle use by its employees. The plan includes increased transit subsidies, the successful Commute Works program, parking validation for patients, and a gradual reduction in the supply of on-campus parking available for employees. The program has, to date, resulted in NEDH having the highest transit subsidy in the LMA, and a continued increase in the cost for on-campus employee parking. By 1997, the Hospital anticipates significant improvements in modal share and vehicle occupancy, thus limiting demand for parking. The Hospital will not increase its on-campus parking supply.

With the above measures in place, NEDH will experience a significant increase in transit ridership and vehicle occupancy rates. The results (shown in Table 3-2) is an increase in long-term parking demand of only 51 spaces. These can be met through increased use of off campus parking. It is NEDH's stated policy that on-campus parking be restricted to patients and visitors; that physicians and second-shift nurses park within the LMA; and that all other employees park outside of the LMA. It is the goal of this institution to identify and develop a long term off-campus facility for use by employees. Table 3-3 displays the anticipated changes in parking assignment likely to occur by 1997.

This Master Plan Transportation Impact Study is the blueprint for NEDH's campus-wide transportation planning process. It is not a project-specific Transportation Access Plan. Assumptions regarding modal share and vehicle occupancy rates have been developed from 1990 and 1991 data. In addition, the Master Plan does not contain an analysis of future roadway operating conditions at local intersections. Based upon discussions with the Boston Redevelopment Authority and the Boston Transportation Department, NEDH will prepare an updated Transportation Access Plan for the Hospital when plans for the Research Building are submitted. The TAP will not only analyze the impacts from the proposed Research Building upon the existing and future roadway network but will also include a new employee and visitor/outpatient transportation and parking survey designed to supplement the data contained in the Master Plan.

A	B	C	D	EMPLOYEES				H	VISITORS							N	O
				E	F	G			I	J	K	L	M				
YEAR	FULL TIME EMPLOYEES	% DAY SHIFT	AUTO MODE SPLIT	AUTO OCCUPANCY	DAILY AUTO'S (ONE WAY)	DAILY TURNOVER RATE (UTILIZATION)	NO OF PARKING SPACES (LONG TERM)	DAILY VISITS (ONE WAY)	AUTO MODE SPLIT	AUTO OCCUPANCY	DAILY AUTO'S (ONE WAY)	TURNOVER RATE (UTILIZATION)	NO OF PARKING SPACES (SHORT TERM)	TOTAL PARKING SPACES			
1991	3250	70%	70%	1.067	1492	1.0	1492	1028	95%	1.2	814	3.5	233	1725			
1997	3730	70%	65%	1.1	1543	1.0	1543	1079	95%	1.2	854	3.5	244	1787			
NET INCREASE +480														+51	+40	+11	+22

NOTES

- Employee Peak Hour Parking Demand = $\frac{B \times C \times D}{E}$
- Visitor Peak Hour Parking Demand = $\frac{I \times J}{K \times M}$

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TABLE 3-2
1997 PEAK PARKING GENERATION



Table 3-3: 1997 Parking Assignments

<u>Facility</u>	<u>Location</u>	<u>Total Spaces</u>	<u>Sublet Spaces</u>	<u>NEDH Physicians</u>	<u>NEDH Nurses</u>	<u>NEDH Others</u>	<u>Visitors/ Visitors</u>
					<u>Day Shifts</u>	<u>Night Shifts</u>	<u>Even/ Rotating Shifts</u>
1. Pilgrim Road Garage	On-Campus	761	170	175	142	112	219
2. 110 Francis Street	On-Campus	310	0	175	0	0	13
3. MASCO	Within LMA	111	0	8	5	0	103
4. Peterborough Street	Nearby	120	33	0	18	38	87
5. 55 Yawkey Way	Nearby	100	0	18	10	53	31
6. 61 Prentiss Street	Nearby	10	0	0	0	0	11
7. 1255 Boylston Street	Nearby	30	0	0	20	0	6
8. 73 Brookline Avenue	Nearby	30	25	5	0	0	7
9. 900 Commonwealth Avenue	Nearby	35	0	0	0	0	33
10. One Brookline Place (Brookline)	Nearby	20	0	5	10	0	11
11. 286 Babcock Street	Nearby	32	0	0	0	0	28
12. TBD	Nearby	<u>101</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>101</u>
		1659	228	386	170	249	653
						203	279

ATTACHMENT A

1991 Existing Levels of Service

CINCH PROGRAM VERSION DATE 4-29-1988
 1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
 NEDH RIVERWAY @ LONGWOOD AVE
 1991 AM EXISTING
 date:12-03-1991 time:11:42:31
 LAST DATA SET NAMES LOADED OR SAVED
 VOLUME=1AM91EX GEOMETRICS=1EX SIGNAL=1AM91EX
 LOCATED IN CBD:Y
 VOLUME & GEOMETRICS

VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	138	581	190	0	1	1	0.0	11.0	10.0	34
WB	7	194	3	1	1	0	9.0	9.0	0.0	34
NB	564	1006	24	1	2	0	11.0	10.0	0.0	59
SB	51	630	234	0	2	1	0.0	10.5	10.0	59

TRAFFIC & ROADWAY CONDITIONS

ADJ PARK				PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N MOVES	BUSES	PHF	CROSS	BUT MIN	TIME TYPE
EB	0.0%	1.2%	N	0	.880	20	Y	15.5 3
WB	-2.0%	8.7%	N	0	.880	20	Y	15.5 3
NB	0.0%	0.3%	N	0	.880	35	Y	21.8 3
SB	0.0%	0.3%	N	0	.880	35	Y	21.8 3

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1								*	*	*		*	*	*		26.0	5	A
2			*				*				*				*	0.0	22	A
3	*	*	*		*	*	*									40.0	5	A
4		*						*	*	*						24.0	0	A

CYCLE= 122.0

VOLUME ADJUSTMENT WORKSHEET

PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	138	581	190	.880	157	660	216
WB	7	194	3	.880	8	220	3
NB	564	1006	24	.880	641	1143	27
SB	51	630	234	.880	58	716	266

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	817	1	1.00	817	0.19	0.00
EB	RT	216	1	1.00	216	0.00	1.00
WB	LT	8	1	1.00	8	1.00	0.00
WB	TH-RT	224	1	1.00	224	0.00	0.02
NB	LT	641	1	1.00	641	1.00	0.00
NB	TH-RT	1170	2	1.05	1229	0.00	0.02
SB	LT-TH	774	2	1.05	813	0.07	0.00
SB	RT	266	1	1.00	266	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN		OPPOSING APPROACH				# LANES			OPPOSING
BEING OPPOSED		VOLUMES			% OPPOSING LEFT TURN	LT	TH	RT	VOLUME
		LT	TH	RT	LT TH RT	LT	TH	RT	
EASTBOUND		8	220	3	100 100 100	1	1	0	224
WESTBOUND		157	660	216	100 100 0	0	1	1	660
NORTHBOUND		58	716	266	100 100 0	0	2	1	774
SOUTHBOUND		641	1143	27	0 52 52	1	2	0	609

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.967	0.994	1.000	1.000	1.000	0.900	1.000	0.853 1327
WB	RT	1800	1	0.933	0.994	1.000	1.000	1.000	0.900	0.850 1.000	1278

CINCH PROGRAM VERSION DATE 4-29-1988
 1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
 NEDH RIVERWAY @ LONGWOOD AVE
 1991 PM EXISTING
 date:12-03-1991 time:11:50:47
 LAST DATA SET NAMES LOADED OR SAVED
 VOLUME=1PM91EX GEOMETRICS=1EX SIGNAL=1PM91EX
 LOCATED IN CBD:Y
 VOLUME & GEOMETRICS

DIR	VOLUMES			# OF LANES			LANE WIDTH			CROSS WALK
	LT	TH	RT	LT	TH	RT	LT	TH	RT	
EB	93	263	286	0	1	1	0.0	11.0	10.0	34
WB	24	521	40	1	1	0	9.0	9.0	0.0	34
NB	342	573	16	1	2	0	11.0	10.0	0.0	59
SB	83	1044	233	0	2	1	0.0	10.5	10.0	59

TRAFFIC & ROADWAY CONDITIONS

DIR	GRADE	%HV	ADJ PARK			PHF	PEDESTRIANS			ARR
			Y/N	MOVES	BUSES		CROSS	BUT	MIN	
EB	0.0%	0.7%	N	0	0	.940	10	Y	15.5	3
WB	-2.0%	1.5%	N	0	0	.940	10	Y	15.5	3
NB	0.0%	0.1%	N	0	0	.940	15	Y	21.8	3
SB	0.0%	0.0%	N	0	0	.940	15	Y	21.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*	*		*	*	*		26.0	5	A
2				*				*				*				*	0.0	22	A
3	*	*	*		*	*	*										43.0	5	A
4			*						*	*	*						15.0	0	A

CYCLE= 116.0

VOLUME ADJUSTMENT WORKSHEET

PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	93	263	286	.940	99	280	304
WB	24	521	40	.940	26	554	43
NB	342	573	16	.940	364	610	17
SB	83	1044	233	.940	88	1111	248

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	379	1	1.00	379	0.26	0.00
EB	RT	304	1	1.00	304	0.00	1.00
WB	LT	26	1	1.00	26	1.00	0.00
WB	TH-RT	597	1	1.00	597	0.00	0.07
NB	LT	364	1	1.00	364	1.00	0.00
NB	TH-RT	627	2	1.05	658	0.00	0.03
SB	LT-TH	1199	2	1.05	1259	0.07	0.00
WB	RT	248	1	1.00	248	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN BEING OPPOSED	OPPOSING APPROACH			% OPPOSING LEFT TURN	# LANES			OPPOSING VOLUME		
	VOLUMES				LT	TH	RT			
EASTBOUND	26	554	43	100	100	100	1	1	0	597
WESTBOUND	99	280	304	100	100	0	0	1	1	280
NORTHBOUND	88	1111	248	100	100	0	0	2	1	1199
SOUTHBOUND	364	610	17	0	63	63	1	2	0	397

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s	
WB	LT-TH	1800	1	0.967	0.997	1.000	1.000	1.000	0.900	1.000	0.309	482

EB	RT	1800	1	0.933	0.997	1.000	1.000	1.000	0.900	0.850	1.000	1281
WB	LT	1800	1	0.900	0.993	1.010	1.000	1.000	0.900	1.000	0.442	645
WB	TH-RT	1800	1	0.900	0.993	1.010	1.000	1.000	0.900	0.989	1.000	1446
NB	LT	1800	1	0.967	1.000	1.000	1.000	1.000	0.900	1.000	0.950	1487
NB	TH-RT	1800	2	0.933	1.000	1.000	1.000	1.000	0.900	0.996	1.000	3010
SB	LT-TH	1800	2	0.950	1.000	1.000	1.000	1.000	0.900	1.000	0.896	2757
SB	RT	1800	1	0.933	1.000	1.000	1.000	1.000	0.900	0.850	1.000	1285

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	116	43	1	379	584	99	0.26	1	597	0.00
WB	116	43	1	26	597	26	1.00	1	280	0.26
SB	116	26	2	1199	1399	88	0.07	2	397	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.332	6.790	0.502	0.261	36.210	0.739	5.632	2.241	0.309	0.309
WB	1359	0.206	24.080	0.700	1.000	18.920	0.000	0.000	1.607	0.442	0.442
SB	3600	0.110	14.834	0.627	0.212	11.166	0.788	5.460	1.795	0.791	0.896

CAPACITY ANALYSIS WORKSHEET

DIR	LN	GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH		379	482	0.79	0.37	179	2.12	*
EB	RT		304	1281	0.24	0.50	640	0.48	
WB	LT		26	645	0.04	0.37	239	0.11	
WB	TH-RT		597	1446	0.41	0.37	536	1.11	
NB	LT		364	1487	0.19	0.13	246	1.48	*
NB	TH-RT		658	3010	0.22	0.35	1064	0.62	
SB	LT-TH		1259	2757	0.46	0.22	618	2.04	*
SB	RT		248	1285	0.19	0.22	288	0.86	

CYCLE=116.0 LOST=32.0 SUM V/S CRIT= 1.43 TOTAL V/C= 1.98

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR

54 LEFT TURNS ON THE CHANGE INTERVAL AND 0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN	GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH		2.12	0.37	116.0	81.44	179	1803.36	0.85	1602.08	F	172.4	
EB	RT		0.48	0.50	116.0	14.45	640	0.44	0.85	12.66	B	4.9	
WB	LT		0.11	0.37	116.0	18.18	239	0.01	0.85	15.46	C	0.5	
WB	TH-RT		1.11	0.37	116.0	29.73	536	70.38	0.85	85.09	F	20.2	
NB	LT		1.48	0.35	116.0	38.57	246	395.26	1.00	433.83	F	48.9	
NB	TH-RT		0.62	0.35	116.0	23.58	1064	0.79	0.85	20.72	C	13.1	
SB	LT-TH		2.04	0.22	116.0	48.83	618	1507.72	0.85	1323.07	F	455.6	
SB	RT		0.86	0.22	116.0	32.87	288	15.35	0.85	40.99	E	6.2	

DIR Delay LOS

EB 894.02 F

WB 82.23 F

NB 167.82 F

SB %1112.16 F

INTERSECTION DELAY =654.44 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 160 SECONDS

WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 160.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS

for chosen cycle length 160.0

suggested timing phase 1 is 40.8 secs green, 5.0 secs yellow + red clear
suggested timing phase 2 is 0.0 secs green, 22.0 secs yellow + red clear
suggested timing phase 3 is 70.2 secs green, 5.0 secs yellow + red clear
suggested timing phase 4 is 17.1 secs green, 0.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
NEDH BROOKLINE AVE @ LONGWOOD
#2 1991 AM EXISTING
date:12-03-1991 time:14:53:20
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=2AM91EX GEOMETRICS=2EX SIGNAL=2AM91EX
LOCATED IN CBD:Y
VOLUME & GEOMETRICS

VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	104	290	35	1	1	0	10.0	11.0	0.0	40
WB	182	187	75	1	1	0	10.0	12.0	0.0	40
NB	44	1014	148	1	2	0	11.0	12.0	0.0	60
SB	192	561	146	1	2	0	11.0	12.0	0.0	60

TRAFFIC & ROADWAY CONDITIONS

				ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN	TIME	TYPE
EB	0.0%	13.0%	N	0	0	.840	10	Y	17.0		3
WB	1.0%	5.0%	N	0	0	.880	10	Y	17.0		3
NB	0.0%	6.0%	N	0	0	.980	35	Y	22.0		3
SB	0.0%	2.0%	N	0	0	.980	30	Y	22.0		3

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*	*	*	*							*	*	*	44.0	4	A
2													*	*	*	11.0	0	A
3								*	*	*		*	*	*		50.0	4	A
4				*			*				*				*	0.0	12	A

CYCLE= 125.0

VOLUME ADJUSTMENT WORKSHEET

PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	104	290	35	.840	124	345	42
WB	182	187	75	.880	207	213	85
NB	44	1014	148	.980	45	1035	151
SB	192	561	146	.980	196	572	149

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN	GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT		124	1	1.00	124	1.00	0.00
EB	TH-RT		387	1	1.00	387	0.00	0.11
WB	LT		207	1	1.00	207	1.00	0.00
WB	TH-RT		298	1	1.00	298	0.00	0.29
NB	LT		45	1	1.00	45	1.00	0.00
NB	TH-RT		1186	2	1.05	1245	0.00	0.13
SB	LT		196	1	1.00	196	1.00	0.00
SB	TH-RT		721	2	1.05	758	0.00	0.21

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN		OPPOSING APPROACH					# LANES			OPPOSING	
BEING OPPOSED		VOLUMES			% OPPOSING LEFT TURN			LT	TH	RT	VOLUME
	LT	TH	RT	LT	TH	RT	LT	TH	RT		
EASTBOUND	207	213	85	100	100	100	1	1	0	298	
WESTBOUND	124	345	42	100	100	100	1	1	0	387	
NORTHBOUND	196	572	149	0	82	82	1	2	0	591	
SOUTHBOUND	45	1035	151	100	100	100	1	2	0	1186	

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN	GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
WB	LT		1800	1	0.933	0.939	1.000	1.000	1.000	0.900	1.000	0.480	681

EB	TH-RT	1800	1	0.967	0.939	1.000	1.000	1.000	0.900	0.984	1.000	1447
WB	LT	1800	1	0.933	0.976	0.995	1.000	1.000	0.900	1.000	0.370	543
WB	TH-RT	1800	1	1.000	0.976	0.995	1.000	1.000	0.900	0.957	1.000	1505
NB	LT	1800	1	0.967	0.971	1.000	1.000	1.000	0.900	1.000	0.397	603
NB	TH-RT	1800	2	1.000	0.971	1.000	1.000	1.000	0.900	0.981	1.000	3086
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	0.900	1.000	0.950	1473
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	0.900	0.969	1.000	3109

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	125	44	1	124	387	124	1.00	1	298	0.00
WB	125	44	1	207	298	207	1.00	1	387	0.00
NB	125	50	1	45	1186	45	1.00	2	591	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.165	27.947	0.689	1.000	16.053	0.000	0.000	1.633	0.480	0.480
WB	1800	0.215	21.822	0.633	1.000	22.178	0.000	0.000	1.777	0.370	0.370
NB	3600	0.164	35.259	0.505	1.000	14.741	0.000	0.000	2.226	0.397	0.397

CAPACITY ANALYSIS WORKSHEET

DIR	LN	GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT		124	681	0.18	0.35	240	0.52	
EB	TH-RT		387	1447	0.27	0.35	509	0.76	
WB	LT		207	543	0.38	0.35	191	1.08	*
WB	TH-RT		298	1505	0.20	0.35	530	0.56	
NB	LT		45	603	0.07	0.40	241	0.19	
NB	TH-RT		1245	3086	0.40	0.40	1234	1.01	*
SB	LT		196	1473	0.09	0.09	199	0.99	*
SB	TH-RT		758	3109	0.24	0.49	1517	0.50	

CYCLE=125.0 LOST=20.0 SUM V/S CRIT= 0.87 TOTAL V/C= 1.04
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
50 LEFT TURNS ON THE CHANGE INTERVAL AND 19 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN	GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT		0.52	0.35	125.0	24.38	240	1.59	0.85	22.07	C	2.8	
EB	TH-RT		0.76	0.35	125.0	27.23	509	4.53	0.85	27.00	D	8.7	
WB	LT		1.08	0.35	125.0	32.21	191	79.68	0.85	95.10	F	7.8	
WB	TH-RT		0.56	0.35	125.0	24.86	530	1.04	0.85	22.02	C	6.7	
NB	LT		0.19	0.40	125.0	18.47	241	0.05	0.85	15.74	C	0.9	
NB	TH-RT		1.01	0.40	125.0	28.67	1234	21.73	0.85	42.84	E	26.5	
SB	LT		0.99	0.49	125.0	24.00	199	45.13	1.00	69.13	F	6.9	
SB	TH-RT		0.50	0.49	125.0	16.46	1517	0.23	0.85	14.19	B	12.8	

DIR Delay LOS

EB	25.80	D
WB	51.97	E
NB	41.89	E
SB	25.48	D

INTERSECTION DELAY = 36.13 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 150 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 150.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 240.7 SECONDS
for chosen cycle length 150.0

suggested timing phase 1 is 56.8 secs green, 4.0 secs yellow + red clear
suggested timing phase 2 is 13.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 3 is 60.2 secs green, 4.0 secs yellow + red clear
suggested timing phase 4 is 0.0 secs green, 12.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
NEDH BROOKLINE AVE @ LONGWOOD
#2 1991 PM EXISTING
date:12-03-1991 time:15:07:08
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=2PM91EX GEOMETRICS=2EX SIGNAL=2PM91EX
LOCATED IN CBD:Y
VOLUME & GEOMETRICS

VOLUMES				# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	144	223	56	1	1	0	10.0	11.0	0.0	40
WB	180	378	187	1	1	0	10.0	12.0	0.0	40
NB	51	774	63	1	2	0	11.0	12.0	0.0	60
SB	307	750	90	1	2	0	11.0	12.0	0.0	60

TRAFFIC & ROADWAY CONDITIONS

DIR		GRADE	%HV	Y/N	ADJ PARK MOVES	BUSES	PHF	CROSS	PEDESTRIANS BUT MIN	TIME	ARR TYPE
EB		0.0%	13.0%	N	0	0	.840	10	Y	17.0	3
WB		1.0%	5.0%	N	0	0	.880	10	Y	17.0	3
NB		0.0%	6.0%	N	0	0	.980	35	Y	22.0	3
SB		0.0%	2.0%	N	0	0	.980	30	Y	22.0	3

PHASINGS

EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*	*	*	*										51.0	4	A
2												*	*	*		17.8	0	A
3								*	*	*		*	*	*		31.1	4	A
4				*			*				*				*	0.0	12	A

CYCLE= 120.0

VOLUME ADJUSTMENT WORKSHEET

PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	144	223	56	.840	171	265	67
WB	180	378	187	.880	205	430	213
NB	51	774	63	.980	52	790	64
SB	307	750	90	.980	313	765	92

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN	GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT		171	1	1.00	171	1.00	0.00
EB	TH-RT		332	1	1.00	332	0.00	0.20
WB	LT		205	1	1.00	205	1.00	0.00
WB	TH-RT		642	1	1.00	642	0.00	0.33
NB	LT		52	1	1.00	52	1.00	0.00
NB	TH-RT		854	2	1.05	897	0.00	0.08
SB	LT		313	1	1.00	313	1.00	0.00
SB	TH-RT		857	2	1.05	900	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN BEING OPPOSED		VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING VOLUME
		LT	TH	RT	LT	TH	RT	LT	TH	RT	
EASTBOUND		205	430	213	100	100	100	1	1	0	642
WESTBOUND		171	265	67	100	100	100	1	1	0	332
NORTHBOUND		313	765	92	0	64	64	1	2	0	545
SOUTHBOUND		52	790	64	100	100	100	1	2	0	854

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN	GROUP	IDEAL N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT		1800	1	0.933	0.939	1.000	1.000	1.000	0.900	1.000	0.184 261

EB	TH-RT	1800	1	0.967	0.939	1.000	1.000	1.000	0.900	0.970	1.000	1426
WB	LT	1800	1	0.933	0.976	0.995	1.000	1.000	0.900	1.000	0.490	719
WB	TH-RT	1800	1	1.000	0.976	0.995	1.000	1.000	0.900	0.950	1.000	1495
NB	LT	1800	1	0.967	0.971	1.000	1.000	1.000	0.900	1.000	0.362	550
NB	TH-RT	1800	2	1.000	0.971	1.000	1.000	1.000	0.900	0.989	1.000	3110
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	0.900	1.000	0.950	1473
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	0.900	0.984	1.000	3156

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	120	51	1	171	332	171	1.00	1	642	0.00
WB	120	51	1	205	642	205	1.00	1	332	0.00
NB	120	31	1	52	854	52	1.00	2	545	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.357	12.769	0.474	1.000	38.249	0.000	0.000	2.375	0.184	0.184
WB	1800	0.185	35.408	0.667	1.000	15.609	0.000	0.000	1.686	0.490	0.490
NB	3600	0.151	15.287	0.535	1.000	15.846	0.000	0.000	2.105	0.362	0.362

CAPACITY ANALYSIS WORKSHEET

DIR	LN	GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT		171	261	0.66	0.43	111	1.55	*
EB	TH-RT		332	1426	0.23	0.43	606	0.55	
WB	LT		205	719	0.28	0.43	306	0.67	
WB	TH-RT		642	1495	0.43	0.43	635	1.01	
NB	LT		52	550	0.09	0.26	143	0.36	
NB	TH-RT		897	3110	0.29	0.26	807	1.11	*
SB	LT		313	1473	0.16	0.15	284	1.10	*
SB	TH-RT		900	3156	0.29	0.41	1288	0.70	

CYCLE=120.0 LOST=20.0 SUM V/S CRIT= 1.11 TOTAL V/C= 1.33

FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 52 LEFT TURNS ON THE CHANGE INTERVAL AND 14 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN	GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT		1.55	0.43	120.0	43.93	111	523.23	0.85	482.08	F	24.6	
EB	TH-RT		0.55	0.43	120.0	19.64	606	0.82	0.85	17.39	C	6.4	
WB	LT		0.67	0.43	120.0	21.06	306	3.80	0.85	21.13	C	3.9	
WB	TH-RT		1.01	0.43	120.0	26.42	635	30.09	0.85	48.03	E	14.7	
NB	LT		0.36	0.26	120.0	27.62	143	0.72	0.85	24.09	C	1.3	
NB	TH-RT		1.11	0.26	120.0	35.14	807	63.47	0.85	83.82	F	30.4	
SB	LT		1.10	0.41	120.0	29.01	284	77.61	1.00	106.62	F	13.7	
SB	TH-RT		0.70	0.41	120.0	22.34	1288	1.19	0.85	20.00	C	16.9	

DIR Delay LOS

EB	175.58	F
WB	41.53	E
NB	80.54	F
SB	42.36	E

INTERSECTION DELAY = 71.58 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 120 TO 120 SECONDS WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 120.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS

for chosen cycle length 120.0

suggested timing phase 1 is 59.2 secs green, 4.0 secs yellow + red clear
suggested timing phase 2 is 14.8 secs green, 0.0 secs yellow + red clear
suggested timing phase 3 is 26.0 secs green, 4.0 secs yellow + red clear
suggested timing phase 4 is 0.0 secs green, 12.0 secs yellow + red clear

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